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THE EXTINCT REGIMENTS OF THE BRITISH ARMY.
(WITH INDEX.)

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THE present tendency of English internal politics with regard to the standing Army is undoubtedly to refine it away into a nucleus for voluntarism, to distil it—if we may employ a somewhat unusual metaphor—into a *madre di vino*, upon which the sherry of independent service is to be formed. The policy of extending the voluntary system so as ultimately to do away, virtually, with the pursuit of arms as a profession, has a specious look in the eyes of that multitude which does not see beyond the sheet of decreasing figures that is skilfully held up to veil a table of increased personal liability—a liability that cannot in fact be diminished whilst England retains her Colonies, whether it is met by evenly distributed taxation, or decoyed ingeniously from the liberality of the few.

It is with a natural regret that the student of military history, whose reading has made him familiar with an active patriotism and with loyalty that burned with a steady flame, dwells upon days which, little as he may be inclined towards laudation of things past, throw out in strong relief the lapsing policy of time present. At different dates during the last two centuries Ministers were enabled to raise troops in England the enumeration of which now reads like fable, and which, in spite of ignorance, mismanagement, and ill-directed energy, wrought the work they were embodied to do by force of numbers and unity of aim.

Political economists point to a ready enlistment as the sign of unemployed labour, or trace the facility of recruiting to the subsidence of a wave of turbulence; to us it seems that such a direction given to idleness is the outcome of the national spirit, and that the immense levies England was enabled to raise at the times we are about to refer to were rather the effect of an impulsive effort than a resultant reaction. Happily the narrower bounds of political economy are as far beyond the scope of the present paper as is the wider field of politics, and we have only touched upon either to intensify the respect we claim as due to the memory of the generations that, single-hearted if slow in action, strengthened the military power of the country at the cost of personal renunciation and public effort.

The limits we have laid down in the following notice of extinct

regiments extend from the Restoration of Charles II to the year in which, under Queen Victoria, the Indian Army, up to that time in the pay of the East India Company, was amalgamated with the Army of the Empire. This selection of a period of 200 years appears arbitrary; but although a standing army may be said to date in England from the reign of Henry VIII, though one of the actually existing regiments owes its origin to Queen Elizabeth in her character of second in Holland's duel with Spain, though, to look back still further for an ultimate origin, one at least of Charles II's French raised corps carries us back in history beyond the date of any standing army to times when a Royal bodyguard was the only permanent force, the choice of one limit is justified by a complete remodelling of the forces upon a plan that lasted almost up to the present time, of the other by the fact that the year 1861, which saw the amalgamation referred to, saw also the earlier efforts of that voluntary movement, dating literally from 1859, which was to revolutionize the British system of home and colonial defence.

The first twenty years of this period will not detain us long. The rapid levies of the Restoration were effected under circumstances so unusual as to be no test of the normal spirit of the country, and as every regiment raised by Charles II is represented in direct descent in the existing Army, we have no excuse for lingering in their ranks after we have observed that he left his army, at his death in 1685, at a strength of about 10,000 men, a number recognized later (in 1697) as an efficient defensive force.

James II, however, increased this number largely, and of the fourteen corps of cavalry embodied during the first year of his reign, six come within the scope of this article as extinct regiments. They include the 5th, 8th, and 10th Horse, the first disbanded in 1690, the others in 1692. Beyond the fact that the 5th, commanded by General Werden, served in Ireland previous to its reduction, and that the others were commanded by Lord Scarsdale and Lord Dover (who subsequently threw in his fortune with the Roman Catholic cause), little is to be discovered of their history. Their equipment was the same as that of the contemporary regiments of cuirassiers, the strength of which, however, varied so far as to be nine troops in the (then) 2nd Horse, while it was only four troops in the (then) 3rd.

A regiment of dragoons, raised by Colonel Richard Hamilton, proceeded to Ireland in the year 1685. It subsequently formed part of King James's Irish Army, and was presumably from the first never on the English establishment. Subsequently to 1691, it was for many years in the service of Louis XIV of France.

To James II's reign belongs also a regiment of horse, raised by his warrant, under Lord Brandon, in September, 1688, two months only before he ceased to reign over England. Unlike Lord Dover, Brandon transferred his allegiance at the Restoration, and his regiment seems to have been disbanded by order of his new master within a few months of its formation.[1] It is probable that Colonel Slingsby's

[1] It would appear that this same regiment was afterwards re-embodied by James and engaged in his service in Ireland.

Horse, also disbanded in 1688, had been raised at the same time as Brandon's.

William III's levies claim a longer notice, and some of the regiments raised by his authority deserve special attention. Although his occupation of England was accomplished without bloodshed, he was hardly seated upon the throne when the partisanship of Louis XIV took the form of supporting the abdicated James in a descent upon Ireland. His rival, who was compelled adequately to garrison the principality of Holland upon the French frontier, and by a strong demonstration in England to prevent his enemies extending their efforts beyond the sister island, would have found it impossible, without a great increase of force, to oppose them with any hope of ultimate success. Accordingly, within a few months from the date of his accession, it became necessary to raise some thousands of soldiers, many of whom were formed into regiments which still survive, but more, raised for the emergency, ceased to exist after the need which had created them.

Exclusive of the Guards, the additions to the English cavalry regiments brought their numbers up to the level of the existing 8th Hussars, and, again excluding Foot Guards, the number of infantry regiments to the 28th, fifteen in all. Some of these were at once sent to Ireland.

Among the regiments raised for the King by private individuals, that of the sagacious Duke of Bolton must have been one of the earliest. Fearing implication in the politics of the losing side, whichever it might prove to be, this crafty courtier, feigning eccentricity, shut himself up within the limits of his Hampshire estate until the tide of revolution had rolled over his country; then emerging from the retreat where he had been turning night into day in sports and revelry, dining, as a contemporary writer states with unbounded amazement, sometimes as late as six or seven o'clock, hunting by night or keeping up a set feast until the early hours of the morning, he made clear his allegiance to the Protestant King, and raised a regiment of foot for his service. It is probable that William judged it wise not to bring his new adherent into the presence of his old monarch, for we hear of the regiment at St. Kitts in 1690, where on the 21st June it was present at the surrender of the island.

The Revocation of the Edict of Nantes, so nearly synchronous with the change of rule in England, placed in William's hands the disposal of a large number of zealous co-religionists, of whom the upper class affected, like the noblemen of the day, the profession of arms. Five regiments of French refugees were raised, equipped, and drilled so promptly that we find them already on active service in August, 1689, the date of raising of some Irish corps.

Of these the Duke of Schomberg formed his regiment of horse, composed of eight troops, in July, and took it over with him to Ireland when he sailed from Highlake in August at the head of his division of 10,000 men. He commanded it in person at the Boyne, where he fell, and was succeeded by Henri de Ruvigny, afterwards Earl of Gallway. Five of his Officers fell besides himself. The strength

of the regiment had been returned in July as 395 men. At the siege of Limerick it lost three Officers killed, besides one who died of his wounds a few days after the assault. At Aghrim, May 12th, 1691, its loss was exceptionally severe: 20 Officers, 40 troopers, and 26 horses killed, testified to the devotion of "Ruvigny's." In 1692 the gallant corps was in camp near Southampton; it then marched to London, and on June 23rd its squadrons "drew up in Hyde Park, bravely accoutred, having tents at the horses' sides, and sixty horses carrying their equipage; and after marched through the city, and are gone for Essex." In July the regiment sailed for Flanders, where in the same month it was engaged against the French at Landen led by the King in person, and honourably distinguished by a conspicuous position in the order of battle. In 1698 a motion for the reduction of the French regiments was brought forward in Parliament and negatived. At this time "Gallway's," as it had now become, consisted of nine troops. Like the following, it was disbanded in 1699.

Colonel Miremont originally raised his regiment of dragoons for Continental service, but on the landing of the Prince of Orange judiciously drafted from its ranks the few Roman Catholics who had taken service with him, and hastened to present it to the King. From this it is apparent that his body of dragoons was not at first confined to refugees of his own nation, although at the time of its disbandment it was altogether Huguenot. It served in Ireland, and was sent later to Flanders; a year before its final reduction it mustered 698 of all ranks in eight troops.

The three French infantry regiments were employed at the blockade of Charlemont Castle in 1690. These were known as La Caillemotte's (a younger brother of Gallway's), Cambon's, and La Melonière's. Schomberg praised their behaviour highly after his experience of them in the north of Ireland, and compared them favourably with his Enniskillen men, who he acknowledged could fight, "but preferred plundering."

La Caillemotte's regiment lost its chief at the battle of the Boyne. He was succeeded by Belcastel, who opened the siege of Limerick by an attack with 120 grenadiers, who scaled the fort, the Colonel at their head, and dropping from the ladders into the place decided its capture. The loss of his regiment at Athlone included 4 Officers, and at Aghrim it amounted to 22 killed and 76 wounded of all ranks. In 1698 it stood at a strength of 967 in thirteen companies.

Colonel Cambon was appointed to his command in 1689. In February, 1690, when he was expecting recruits from Switzerland who joined a few days later, he reported it at a strength of 468 of all ranks. At the desperate battle of Aghrim the loss to the regiment was 13 killed and 47 wounded. Cambon was as bad-tempered as he was brave, and gave more than one proof of insubordination. Eventually, in 1693, his Officers petitioned against him on the general ground of mismanagement, and he was superseded; but the news of his removal from the regiment brought on an illness, and the King

was persuaded to delay the public announcement of his disgrace until after his death, which occurred on August 9th. The Comte de Marton, afterwards Earl of Lifford in the Irish peerage, succeeded him under date August 10th, 1693, and the regiment is better known by his name, as Marton's or Lifford's. Its roll of 1698 is still extant. It shows a strength of 13 companies, and the total of commissioned Officers, including Chaplain and Surgeon-Major, is 78.

Colonel La Melonière, who had previously enrolled Huguenot refugees into a corps destined to aid in the invasion of England from the Hague, was appointed to the third infantry regiment raised by Schomberg or Gallway. This served also in Ireland, and was withdrawn in 1692, proceeding later to Holland, where in 1698 it was returned at a strength of 13 companies. In the February following the five French regiments were disbanded, the Officers being borne upon the Irish half-pay list.

The 5th Dragoons (Irish Grenadiers) dated only a few weeks later than the Huguenot regiments. The 5th has a history that cannot be passed over, since, but for an incident of the Irish rebellion at the end of the eighteenth century, the number would have retained its continuity to the present day, like those of the regiments ranking before and after the existing 5th Lancers, which after a lapse of sixty years was raised to fill the empty space. The old 5th and the existing 6th, or Inniskilling Dragoons, were raised in the neighbourhood of Londonderry and Enniskillen for the defence of Derry, besieged in 1689 by King James, and were first quartered at Inch in its immediate vicinity. Both were principally officered from the existing 9th Foot, and Captain Wynn of that regiment, better known as Brigadier Wynn, had the first command of the troop or troops that formed the nucleus of the 5th Grenadiers. The two regiments were embodied at the end of the year and served throughout the war, charged on the Irish establishment. In February, 1690, a Lieutenant-Colonel of the 5th went over to Ireland to buy saddles and bridles for the regiment, which was then ill mounted and set up. Schomberg calls it the Londonderry Regiment.

It was in Marlborough's Continental campaign that the 5th chiefly distinguished itself. On its arrival in Germany the regiment consisted of six troops. Two squadrons were present in the first line both at Schellenberg and Blenheim—the Quatre Bras and Waterloo of the eighteenth century—and at the latter battle their valour was so conspicuous as to occasion the honourable addition of three troops to the strength of the regiment. At Ramilies a year later it earned the distinction of a Grenadier corps, in common with the existing Scots Greys. General Rosse had succeeded Wynn in the Colonelcy in 1695, and it was under his name that it was recorded of the 5th that, in company with the Scots and King's Dragoon Guards, it compelled the surrender of the *Régiment du Roi* at the close of the action. A regiment with such an early history was not likely to depart from its traditions when called upon for service, but kept entirely upon the Irish establishment it does not appear that the 5th Grenadiers were employed upon service later than in Queen Anne's reign. In the

unfortunate Irish rebellion of 1797, when the Government employed it against the rebels, its discipline up to within a few weeks of its disbanding was unexceptionable. Just before this catastrophe the Irish Grenadiers were publicly thanked by General Fox for their conduct during a march of 200 miles on foot, and for their unremitting regularity under his command. In the previous year the permanence of the nine troops had been secured to the regiment then at Rosse, for its behaviour on the 1st of June. When the King's troops, owing to repeated attacks from fresh bodies of the rebels, had fallen back, the 5th charging with pikes, in the use of which they had been exercised, upon the enemy's heavy squadron, had restored the fortunes of the day. At Vinegar Hill, too, the regiment led the charge into Enniscorthy, which was the means of retaking the guns and dislodging the rebels, while at Arklow its good conduct was again conspicuous. A crafty plot laid by the rebels was the cause of the disbandment of the 5th, a measure that was perhaps unavoidable at so critical a time, however sweepingly severe it appears at the present day.

Headquarters were at Dublin, whither they had marched from Lehaunstown, leaving detachments there and in other villages with recruiting orders. A number of rebel partisans enlisted under false pretences, especially at Castle Comer, and were drafted to Lehaunstown, where they made an effort to seize the place by a night attack, in concert with confederates from the hills. The design was revealed just before its execution, and the conspirators seized and punished. But the regiment was sent to England, and after being held for some weeks at Chatham, was broke there on April 10th, 1799, the order for its disbandment recalling in its line of argument Cæsar's famous apology for the divorce of his wife.

Delamere's, Drogheda's, Lisburne's, Lovelace's, Kingston's, and Roscommon's Dragoons, raised for King William's service in Ireland, all ceased to exist as regiments when the troubles in that country were quieted. Delamere was succeeded in his command by Colonel Russel; his regiment served at Dundalk.

One, if not more, of William's own Orange regiments served in Ireland. Count Solmes' Foot Guards which he brought over with him, at a strength of 2,000 men in 25 companies, was in British pay in 1690, if not earlier, increased to 27 companies, and estimated at an annual charge to the State of 56,851*l*. The muster then was 2,634 of all ranks. But the extra cost of maintaining his guards did not fall upon England, since William diplomatically exchanged some of his English for the Dutch troops, those of doubtful fidelity to the new dynasty drawing pay from the States-General. In 1698, writing to Lord Gallway about the Irish garrisons, after mentioning his order for the five French regiments then in Holland to embark at Ostend for Ireland, he says: "Instead of my own regiment of Eppinger's Dragoons (apparently expected by the Irish Commander-in-Chief), I will send you two regiments of foot, which will be much the same expense."

We have seen that the Huguenot regiments were disbanded in

1699. About the same time Wolsey's Dragoons on the Irish establishment, and at least four regiments of foot, among which Wheterang's and Fielding's may have been included, shared their fate.

The year 1693 saw the formation of the first troop of Horse Grenadier Guards, the second troop dating from 1702. These ranked immediately after the Life Guards of Horse, between them and the Oxford Blues, and were part of the Body Guard. A proof of this was given in 1741, by which time the Life Guards were expanded into four troops, when the Colonels of these and of the two troops of Horse Grenadiers drew lots for the coveted honour of foreign service. It fell upon the 3rd and 4th Horse Guards and the 2nd Horse Grenadier Guards, commanded respectively by the Earls of Albemarle and Effingham and Lord Crawfurd. These 3rd and 4th troops of Horse Guards were disbanded in 1746, at a time when several regiments of horse were re-equipped as dragoons for reasons of economy. The 4th troop had been raised in favour of Henry, Lord Dover, who was appointed its Captain-and-Lieutenant-Colonel. He followed the fortunes of James II in Ireland, as we have seen, but subsequently made submission to William and lived the remainder of his life in retirement. Henri de Nassau, Seigneur d'Auverquerque, was his immediate successor. The annual saving by the reduction of these troops of Life Guards was estimated at 33,093*l*. But the Horse Grenadiers survived until May, 1788, and their lists of Colonels include some of the most noted soldiers of the day. On their disbandment, to quote a contemporary magazine, "not one of the rank and file enlisted in inferior corps. They received with their discharge the money they gave on entering, viz., 100 guineas, with some small deduction." It is further noted that the Officers were to receive full pay during their lives, and that on May 26th the Blues took the place of the Horse Grenadiers in guard-mounting at Whitehall.

Lord Windsor's Horse was raised February 1st, 1693. It was apparently numbered 1st Horse on the Irish establishment, and was not disbanded until 1712.

It is evident that a foreign infantry regiment of Lord Gallway's raising, with him on his political mission to Piedmont, which lasted from 1793 to 1796, was on the Irish establishment. The half pay withdrawn for a time from the surviving Officers was assured to them again in 1718 by George I. Queen Anne's Continental wars were the occasion of large levies, extending over some years, and included the existing 29th—39th Foot, which date from the first two years of the eighteenth century. After the Treaty of Utrecht, or rather whilst it was pending—for the negotiations about its exact terms were dragged through many months, despite the unanimity of the Contracting Powers as to its necessity—an immense number of regiments that had been raised subsequently to the year 1702 were disbanded. These again included some foreign corps used for service in Portugal, to whose King a large contingent had been promised by England as her ally against France.

In 1706 six of these regiments were raised for service in Spain. They were originally given to Colonels Paulin, Montagu, Sibourg, La Berthe, the Earl of Lifford, and the Comte de Nassau, but Lifford, Paulin, and Montagu, having refused to serve under Brigadier Guiscard, were replaced by Colonels Vimaire, Fontjuliane, and Blosset. Nassau's Dragoons and Sibourg's and Blosset's Foot were then fully equipped and sent to Spain, joining at Alicante in 1707. They may have formed part of Lord Rivers's division, which sailed from Torbay early in that month 8,297 strong, but which was shortly afterwards found to be so much weakened (the extent of his loss is stated in a contemporary history at 4,500 men) that he found it necessary to absorb into his army the privates of six regiments on the English pay then serving in Valencia and Catalonia. The Officers returned to England to recruit. Four more regiments on the Irish establishment were sent out in April, and three more followed these. Two of these last, Preston's and Wemyss's, were composed of drafts from the home forces, an innovation in Queen Anne's reign, for up to that time it had not been allowed except in the rare event of West Indian service. Preston's regiment was principally, if not entirely, composed of drafts from the Guards on the English establishment, Wemyss's from those on the Irish. Nassau's Dragoons fought at Almanza, where their loss was 3 Officers killed, 6 wounded prisoners, and 11 unwounded prisoners of all ranks. Blosset's and Sibourg's regiments were on that disastrous day in garrison at Alicante. Sibourg's remained there during the siege of 1708, when the town held out through the whole winter against the attacks of a combined force of French and Spaniards. On its final refusal to surrender, the citadel, previously undermined by the besiegers, was blown up; Sibourg, who had been warned of the intention, perished in the explosion with 31 of his Officers and soldiers. On Lieutenant-Colonel D'Albon succeeding to the command of the garrison, he surrendered, and the troops marched out with the honours of war, taking with them two guns, and after joining the British fleet, were conveyed to Minorca.

In 1709 six regiments of Portuguese dragoons, in British pay, and officered by Englishmen and French refugees, were serving in Portugal. These had been raised by Lord Gallway. The King's intention had been that his own subjects should divide the command with his allies, but Gallway stoutly maintained his opinion of the futility of such a scheme, and Charles yielded with a good grace. Colonels Balthazar de Foissac, Jean Pierre Desbordes, Paul de Gually, Magny, Sarlande, and De la Bouchetière (late of Schomberg's Horse) commanded these regiments, which were all disbanded in 1712. The Earl of Stair's, the Marquis d'Assa's, Sir Daniel O'Carroll's, Stanhope's, and Withers's Dragoons were disbanded in 1713, as also the following regiments of foot:—Primrose's, Mordaunt's, Newton's, Molesworth's, Leigh's, Evans's, Kane's, and Stanwix's marines; the infantry regiments of Montagu, Rooke, Nassau, Wynne, Butler, and Stanhope preceded them by a few months in the date of their disbandment. Of these, some certainly served and were presumably raised for service in Spain, like Mountjoy's, Brudenell's, Caulfield's, and Lord

Mark Kerr's, which must have been disbanded about the same time. Mountjoy's was one of the regiments that surrendered at Almanza, the battle that was fought by an English Army under the command of a Frenchman, Gallway, against a French force under the orders of an Englishman, Berwick, the nephew of Marlborough. Lord Mark Kerr's was also present at Almanza. Lord Gallway complained of the cowardly conduct of the "two new raised regiments of dragoons" there, upon whose unsteadiness he laid much of the blame of his defeat. One of these must have been Nassau's. Cavalier's Cevenols formed a regiment sent into Spain in 1707. They had been recruited to a regiment and quartered in Holland waiting for employment against the French monarch, who had dragooned and almost depopulated their dissenting district. But it seems uncertain if these refugees from the Cevennes were in the pay of England except for the time. Most probably they were not borne upon the English establishment, although their Colonel was later on the English half pay.

Some Dutch troops in the pay of England also served in Spain.

The Swiss regiment of Albemarle is mentioned as serving at Wynendaal under Marlborough in 1708. It was commanded there by M. de Hirtzel, and behaved well. Lucas's Horse, on the Irish establishment, raised December 1st, 1709, and disbanded under his name in 1713, had previously been commanded by Colonel Selwyn. There was also a regiment, known as Clayton's, raised in 1710, and that was serving in Canada in 1711, but little is known of these short-lived corps.

The reign of George I, after the dispersion of the Jacobite rising of 1715, was little troubled by war either at home or abroad. To oppose the invasion of 1715, several regiments of dragoons were raised, which included the existing light cavalry regiments, numbered 9th—14th, and Molesworth's, Stair's, and Churchill's, all three of which fought at Preston, and must have been disbanded shortly afterwards. He also added two regiments to the line, the 40th, formed of independent companies in North America, which had been raised a few years previously for colonial defence, and the 41st, a corps of "invalids," raised and employed for garrison service.

Large levies were made in the time of his successor. George II was more Hanoverian than English, and his foreign policy embroiled him with the other European Powers, and involved him in the War of the Succession, whilst at home he had to contend with disaffection in the north, culminating in the campaign of 1745–46.

His first strong levy was made in 1739. In this year the independent Highland companies of 1730 were formed into a regiment known now, as then, by the name of the Black Watch, and in England ten regiments of marines were added to the standing Army. General Oglethorpe's regiment, numbered for a time 42nd, preceded these, however. He was appointed Governor of Georgia in 1738, and a regiment was raised to accompany him, which was at the same time to form a defence for his province, and to buttress the shaking strength of South Carolina. It was not, however, until 1739 that he received its support; during the year that intervened he had to pro-

vide defence for Georgia in an irregular manner, and at great expense to the Colony. His regiment was disbanded in 1748, and the number subsequently given to the Black Watch, originally numbered 43rd.

The ten new regiments of marines were numbered 44th—53rd, and disbanded together in 1748. Many of them saw active service. The 44th (or 1st Marines) was commanded by the father of Brigadier James Wolfe, Edward Wolfe, who was transferred later to the 8th Foot, and succeeded by Colonel Churchill. This regiment was 1,100 strong at the time of its disbandment. The 2nd Marines was raised at a strength of 1,000 men in ten companies, and was commanded successively by Colonels William Robinson and Fraser. It was broke at Plymouth in November, 1748, when it mustered 1,100 men. The 3rd Marines was commanded in succession by Anthony Lowther and Colonel Holmes; the 4th by Colonels James Tyrrell and Lord Torrington. The 5th Marines, or 48th Regiment, was employed in the Mediterranean. It was first commanded by Colonel Douglas, who fell at the siege of Carthagena, and next by James Grant, who was killed at Fort Lazare on April 9th, 1741; Cochrane succeeded Grant in the command. The 6th was successively commanded by Colonels Morton, Cotterell, and Laforey, and the 7th throughout by Colonel H. Cornwallis. The 8th Marines was serving in America in 1742. Colonel Jordan succeeded Hammer, in whose name the regiment was raised, and by which it is best known. The 9th was commanded by Colonel Paulet. The 10th, or 53rd of the line, was stationed at Gibraltar at a time when our Mediterranean stations, which then included Minorca, required especial vigilance for their defence. Its Colonel, Jefferies, was broke there for false musters, and was succeeded by Sir Andrew Agnew.

A regiment commanded by Colonel Gooch, which was employed in North America, dated from December 29th, 1739, and was disbanded in 1742. It was raised for Colonial defensive service, and may have been formed from some of the independent companies of foot which at that time garrisoned our western possessions. Gooch was Governor of Virginia, where his regiment, known as "the Old Americans," principally served. In Jamaica, under date 1742, we find eight of these independent companies, at New York four, in Bermuda one, at Providence one, and some had been raised for South Carolina, for they are "ordered to be disbanded" shortly afterwards.

The original 60th also dates from 1739. It consisted of two battalions, to the command of both which Sir B. Hope was gazetted in 1743, in succession to an earlier Colonel-in-Chief. This regiment was on the Irish establishment, and reduced like the marines in 1748, at the conclusion of our war with France.

The existing 43rd Regiment was raised in 1741. Battereau's Foot, raised March 29th, 1742, was present at Culloden. It temporarily occupied the number 62nd. At Culloden its position was in the centre of the third line, which was barely engaged. The casualty return only gives 3 wounded to the 62nd, while the loss of the 27th and 13th, in the same line, is returned blank, and the total loss of the 3rd Foot only includes 1 killed and 1 wounded. This third line was

in reserve behind the guns, and flanked by Kingston's Horse. Battereau's Foot was reduced at Stirling, six years after its formation, when it stood at a strength of 1,555 of all ranks.

The Jacobite insurrection of 1745 was the occasion of a display of loyalty towards the reigning house that among the upper classes took the form of military service. The Duke of Kingston's, the Duke of Montagu's, the Duke of Bolton's, the Duke of Ancaster's, the Marquis of Granby's, the Earl of Berkeley's, Viscount Falmouth's, and Viscount Harcourt's regiment of horse, with the Derby Blues, were all raised for this emergency and disbanded the following year. The Dukes of Montagu and Ancaster, with Lords Berkeley and Harcourt, each embodied besides their horse a regiment of foot, among which Montagu's was distinguished as the Ordnance Corps, and the Duke of Bedford, the Earl of Cholmondeley, and the Lords Edgecumbe and Gower followed their example. All these regiments were disbanded at different dates in the year 1746, and the two last existed for an especially short space of time, for Gower's was raised in October and Edgecumbe's as late as December, 1745, and both were disbanded in January, 1746, as were Berkeley's and Harcourt's Foot. The others followed somewhat later, but when we consider that the Scotch campaign proper had then to come, and that Falkirk and Culloden were still unfought, it becomes obvious that the majority of these regiments acted only as local fencibles, and that though regularly embodied there was no question of employing them beyond the limits of their own countries or districts.

The Duke of Kingston's Horse was an exception, though it was actually disbanded in 1746; it was embodied again on the spot as the original 15th Light Horse, and existed until 1749, when it was finally reduced. This exceptional compliment to the valour of the regiment was earned by its behaviour on the march to Scotland that followed directly upon its raising, and by its conduct at Culloden, where Kingston's Horse was posted, in the order of battle, on the flanks of the third line. Shortly after the commencement of the battle it was thrown forward against the enemy's left, having outflanked it simultaneously with a similar movement of Hawley's Dragoons on the rebel right, effected a junction with his squadrons in rear of their broken first line, and so ensured their discomfiture. Kingston's Horse was, after this, sent to Flanders, but on September 15th, 1746, we find it mustered at Nottingham for disbandment. "The common men had each three guineas given them with their bridles and saddles, and every Officer and soldier had a printed copy of the Secretary at War's letter to the Duke of Kingston. All the men except eight enlisted immediately into the Duke's (Cumberland) new regiment, and those gentlemen who did not gave reasons very satisfactory and honourable."[1] This new regiment, which consisted of six troops and which was commanded by the conqueror of Culloden, was disbanded in its turn at Nottingham in 1749.

Eighteen Independent Companies of Foot in Great Britain ceased to exist in 1746.

[1] "Gentleman's Magazine."

The Earl of Loudoun's Foot was disbanded in 1748 at a strength of 1,045. It was numbered 64th.

Colonel Shirley's regiment, raised September 8th, 1745, bore the number 65th, and mustered 815 of all ranks at the time of its reduction. It was stationed at Cape Breton, and disbanded in 1748.

This regiment had its counterpart in the 66th (Colonel William Pepperell), which was raised in 1744 in Massachusetts and the neighbouring districts, and disbanded likewise in 1748. Pepperell is said to have been a native of the Colony. He led the 66th in the expedition against Cape Breton, and a few years later was appointed to another new-raised regiment.

A 61st and 63rd must presumably have existed, but do not appear under these numbers in any records of active service. It is probable that, like Shirley's and Pepperell's, they were employed in some one of our Atlantic Colonies; Frampton's regiment, disbanded in 1748, may have represented one of the missing numbers.

Twelve Independent Companies raised for service in the East Indies sailed with Admiral Boscawen, and in 1748 were employed under him in active service. They fought at the action of Aria-coupan, and at the unsuccessful siege of Pondicherry. On the return of the force to England they were disbanded on Christmas Day, 1750.

The Treaty of Aix-la-Chapelle did not assure to Europe a lasting peace. Before five years had passed from the date of its conclusion in 1748 the mutual jealousies of English and French colonists in America were causing an uneasiness to the home Governments that was prophetic of the rupture between the Powers in 1755.

Two regiments were raised in consequence in 1754, a new 50th and 51st, commanded by the Colonels Shirley and Pepperell, whom we have already seen commanding in America. These two corps served in the American continent, and seem to have composed the force, 1,200 strong, that surrendered at Fort Oswego on Christmas Day, 1756, and not to have been reassembled, since that is the date of their official disbandment. On General Braddock's death, near Fort Duquesne, Shirley had succeeded to the command of the Virginian expedition, and he found, as his predecessor had done, that the provincial militia were far better fitted to meet the irregular warfare of those Indians who, as allies of the French, were enemies to the English, than the newly-raised home battalions. On the capitulation of Montreal in September, 1760, the colours of these two regiments were recovered from the French and honourably lodged at headquarters.

These two numbers, left vacant again, were filled in a few months by the existing 50th and 51st, which had been raised a year before on Christmas Day, 1755, and at first numbered 52nd and 53rd. These were only a part of the levy of that year, which consisted of eleven infantry battalions numbered 50th to 60th inclusive. The present 52nd was also renumbered from 54th.

The Army List of 1755 gives fifteen recruiting corps of irregular formation, stationed at different unrecorded places.

By this time England was again at war with France on the subject of the Pragmatic Sanction. Hanover was invaded, and recruiting went on rapidly for the campaigns in Germany. In 1757 and the two following years fifteen regiments, numbered 71st to 84th, were added to the line, all which, with those now to be mentioned, were disbanded in 1763 after the conclusion of the Treaty of Paris. Several of those deserve individual notice, although in many cases only the bare dates of their raising, with the names of their Colonels, can be given. The intervals between the numbers 60th and 71st were filled by existing regiments, but these were not new levies, having existed previously as 2nd battalions of older corps, though they now first acquired a distinct individuality.

The 71st, commanded by William Petitot, was apparently never employed on foreign service, but formed part of the home garrison.

The command of the 72nd was given to the Duke of Richmond under date May 9th, 1759. It served in the autumn of the same year, in Elliot's Brigade, on the St. Malo expedition. In 1761 or 1762 this regiment was sent from England to the West Indies, and was engaged at the attack upon Cuba in 1762.

The 73rd, Colonel William Browne, was originally the 2nd Battalion added to the 32nd Foot in 1756, when the regiment was quartered in Scotland at Fort Augustus. When separately embodied it was placed upon the Irish establishment.

The 74th served, like the 72nd, in the St. Malo expedition, and formed part of the same 4th Brigade. Like the 72nd, too, it was employed on colonial service. In 1760 four companies of the regiment were in Senegal and six in the West India Islands. Sherard Talbot, its first Colonel, whose appointment was dated May 9th, 1758, was transferred in 1761 to the 43rd Foot, and was succeeded in the command of the 74th by Colonel Irwin.

Gage-John Boscawen was the first Colonel of the 75th. He was followed by Lord Forbes, better known as Earl of Granard, on his appointment to the 23rd. The 75th was quartered in the Channel Islands in 1760 and 1761, and consequently chosen to form part of the force sent in the latter year against Belleisle.

Previous to his appointment to the 75th Lord Forbes had commanded the 76th. This must have been a light-infantry corps, as the junior Officers were Second Lieutenants, and it comprised two battalions. A part of the regiment was present at Quebec in the engagement of September 13th, 1759. In the following year we find the 1st Battalion in Ireland, whilst the 2nd was at Goree in Africa. This one served in 1761 in the West Indies, where it was present at the assault of Guadaloupe, and in 1762 engaged in the attack upon Martinique. William Rufane succeeded to the command upon Lord Forbes's transfer to the 75th in 1761.

The 77th was a Highland regiment raised at a strength of 1,000 men, and commanded by Archibald Montgomery. He led a force of 1,200 strong, which included part of his own regiment and of the Royal Scots, into Canada in June, 1760, which was directed against a settlement of the Cherokee Indians. He was attacked 5 miles

from Etchoee by 500 Indians, and sustained an engagement which lasted several hours. The Highlanders lost eight killed and thirty wounded, and the force was withdrawn to Halifax for the winter. The Grenadier company of the 77th was at the attack upon St. John in September, 1762, and the regiment was represented, if it did not muster in force, at the assault of Cuba and the attack upon Martinique in the same year.

The 78th, another Highland corps, was, like the 77th, a Lieutenant-Colonel's command. Simon Fraser was appointed to it June 21st, 1759. He was a relative of that Lord Lovat whose temporizing policy lost him the respect of the Jacobite party, and, at the same time, led to his execution by the Whigs after the rising of 1746. Fraser had commanded an independent company, known by his name, for more than a year previously. It had sailed from Nantucket in April, 1758, been employed in Canada, and was at the action near Fort Duquesne on September 14th. But though nominally a company, Fraser had brought up its strength to 1,200 men, and the constitution of the corps cannot have needed material change on its formation into a regiment. This gallant soldier, who was destined to serve his country later in the War of Independence, ultimately fell at the battle of Stillwater in 1777, and was buried on the field. In the Canadian War his regiment was constantly engaged. In July, 1759, he led 300 of his men on a victualling expedition, and on the 24th of the month was wounded in the thigh while on this service. On August 8th his light company was employed at a landing designed to be made at Point-au-Tremble on the north shore of the St. Lawrence, which failed of its object. Up to the time of the assault of the Heights of Abraham the regiment was continually occupied, and in the first week of September was opportunely reinforced by the arrival of an additional company from England, commanded by Fraser of Culduthull. Colonel Fraser's light company was included in the light division that played an important part in the landing below Quebec of September 12th, and the regiment was present at the battle the following day. At Sillery, an engagement fought in the same neighbourhood in the following year, the 78th was again present, mustering 662 of all ranks. The regiment was not brought home to be disbanded at the conclusion of peace, but was reduced in America in 1763, as we shall be reminded when we come to the enlistment for the American War.

The 79th performed distinguished service in the East Indies. Its Colonel was the gallant William Draper, better known as General Draper, who ably assisted Governor Pigot in holding out Madras against Lally's forces in 1759. At Windewash a few weeks later, when the French had been compelled to raise the siege, and the English in their turn had assumed the offensive in the Carnatic, the regiment was under the command of Major Brereton, Draper having returned to England on sick leave. Brereton fell at its head whilst carrying out General Coote's order to confirm the success he had gained by his repulse of the French attack by an advance against one of their fortified positions, but he lived to see Major Monson,

upon whom the command devolved, achieve the capture of the post. In this engagement the French regiments of Lorraine and Lally were routed, and Lally only saved the remnant of his force by abandoning his camp to the English. M. de Bussy, commanding Lally's regiment, yielded his sword to Monson. The loss of the 79th in the battle of Windewash was 18 of all ranks killed and 72 wounded. In the expedition against Manilla in 1761 Draper accompanied Admiral Cornish as commander of the land forces, which included his own regiment, a few more Royal and some East India Company's troops. The capital of the Island of Luzon was taken after a long defence by Spaniards and native Indians, who were aided by an extreme heat that added greatly to the difficulties of the English. The place was eventually carried by assault. The sixty volunteers of the forlorn hope were supported by the grenadier company of the 79th, the whole party being under the command of Lieutenant Russel. Colonel Monson and Major More followed with two divisions of the regiment, then came a body of seamen, and finally the troops of the East India Company. The Spaniards were driven from their works and the place entered with little comparative loss; the 79th, however, had 3 Officers killed and 4 Officers and 45 men wounded. This was in 1762, and the regiment was shortly afterwards ordered home. It reached England in January, 1766, after a voyage of twenty-one months, but the climate had supplemented the ravages of war, and it stood at half its old strength. In June it was sent to Chatham and disbanded.

The 80th was a regiment of light-armed foot, and served in America. It was commanded in succession by Lieutenant-Colonels the Hon. Thomas Gage (May 9th, 1758), and the Hon. Lucius Ferdinand Carey. A detachment numbering 400 was despatched with the expedition against Ticonderoga, and it served again, in Martinique, in 1762.

The 81st Foot was a regiment of invalids. It was at first quartered in Guernsey under the command of Lord Lindores, who was afterwards transferred to the 41st Foot. It was subsequently in garrison in Germany, and in 1764 was renumbered 71st (Invalids). Disbanded 1768.

The 82nd was another regiment of invalids, and its Colonel, John Parker, was also transferred to the 41st (Invalids). Like the 81st, it was employed in garrison service in Germany, where both were quartered at Embden in 1760, renumbered 72nd in 1764, and not disbanded until 1768.

The 83rd was raised and retained on the Irish establishment. Sir John Sebright, its first Colonel, when removed in 1760 to the 52nd, was succeeded by Bigoe Armstrong.

The 84th, raised on Christmas Day, 1758, served in India. It was present a year later at the battle of Windewash, and lost there 14 killed and 39 wounded of all ranks. It served also at the action of Cutwa, July 14th, and at those at Anda Nullah, August 25th and September 4th, 1763. The regiment was commanded by the distinguished Eyre Coote, with the rank of Lieutenant-Colonel.

The 85th was raised in 1759. This light infantry regiment was known as Craufurd's Royal Volunteers. Craufurd commanded as Lieutenant-Colonel, and his regimental staff numbered fifty-eight Officers. Much local interest was excited by its embodiment, and the ceremony observed at the consecration of the colours testifies to the patriotic feeling that prevailed in the country at the time. A service was held at Shrewsbury, the rendezvous of the corps, on January 2nd, 1760, at which they were consecrated. During the prayers and sermon the colours were held over the heads of the Lieutenant-Colonel Commandant and his Acting Lieutenant-Colonel, Lord Pulteney. The regiment was then marched to the quarry, where the colours held by these two Officers were saluted and kissed, after which Craufurd entertained his staff at dinner, from which they repaired to a ball given by Lord Pulteney. After this auspicious opening the career of the 85th was one of continual service. It began with Belleisle in 1761, and during the remainder of its existence the regiment was serving in Portugal under La Lippe, a German, who by means of the 10,000 men of the British Contingent, was mainly instrumental in forcing the Spaniards to evacuate Portugal.

The 86th was formed by drafts from other regiments. It was stationed in Senegal in 1760 and 1761, its Lieutenant-Colonel Commandant, Worge, being Governor of that Colony.

The Highlanders who were so greatly distinguished in Germany as Keith's were numbered 87th soon after their embodiment on August 25th, 1759. The regiment was sent at once to Germany, and was engaged at Warbourg and at Campen, before going into winter quarters at Embden in 1760. In 1761 it fought at Fellinghausen, brigaded with Campbell's 88th Highlanders and two companies of Grenadiers under Beckwith, in the Marquis of Granby's Corps d'Armée. "They attacked on the left," says the historian of the war, "and succeeded in taking several cannon." In the following year the 87th served with equal valour at the battle of Wilhelmstahl, where they were again on the right in Beckwith's brigade.

The 88th, commanded, as Lieutenant-Colonel, by John Campbell, was equally distinguished. The regiment was known as the Highland Volunteers. It fought, like Keith's, at Warburg, Campen, Fellinghausen, and Wilhelmstahl, as well as being present at Grabenstein and Zierenberg. At the latter engagement Campbell's Highlanders were brigaded with Kingsley's Minden heroes, the 20th Foot, and behaved with courage in the attack upon the French cantonments. The loss of the regiment at Campen in 1760 was 24 killed, 5 wounded.

The 89th, though raised among the Gordon clan, was borne upon the Irish establishment. The regimental staff on its formation consisted of 1 Lieutenant-Colonel, 2 Majors, 7 Captains, 1 Captain-Lieutenant, 16 Lieutenants, 8 Ensigns, the Chaplain, Adjutant, and Quartermaster. Lieutenant-Colonel Bagshaw was succeeded in the command by Staats-Long Morris, who was gazetted to the 89th, when it was in Ireland, June, 1760, and afterwards commanded the regiment in India.

The 90th was an Irish regiment. Hugh Morgan, James Grant, and James Stuart commanded it as Lieutenant-Colonels, in succession. Six companies of the 90th were employed at Belleisle, but the principal service of this light infantry corps was at the siege of Fort Moro, in the Havannah. After a laborious investment of sixteen days the attack had nearly failed, but the desperate valour of the British troops carried the fort, June 6th, 1762, under the fire of the two defending batteries.

The 91st again was Irish. Cadwallader Blayney, who succeeded to the family title as Lord Blayney in 1761, commanded as Lieutenant-Colonel. The regiment, which was raised at a considerable strength, served with him in America, and afterwards in 1762 at Martinique.

The 92nd Regiment, although disbanded, like those preceding, in 1763, was not raised until 1760. It was kept upon the Irish establishment, and was commanded by Lieutenant-Colonel Ralph Gore, with an acting Lieutenant-Colonel, Flayrac, and thirty-eight more commissioned Officers.

The regiment raised by William, Earl of Sutherland, in Scotland, was numbered 93rd for a short time. Sutherland arrived in his own county with a recruiting warrant, in August, 1752, and in the space of nine days raise 1,100 men who assembled at his muster on the 11th of the month. The size of the recruits was such that no light company was formed. The regiment does not appear to have borne a number, except for a few months prior to its disbandment in 1763.

The command of the 94th Royal Welsh Volunteers was held successively by John Vaughan, James Dundas, and J. Tillikens. This light infantry regiment served in America.

The 95th raised in America was embodied in 1760, and commanded by Ralph Burton.

The 96th served in India and the command was given to George Monson, the Field Officer of Draper's 79th Regiment, who distinguished himself at the battle of Windewash and the assault of Manilla.

The 97th was raised October 28th, 1760, and commanded by James Stuart. It served at Belleisle, and later in Germany, where it was present at Fellinghausen.

The 98th, commanded by Colonel Charles Grey, was raised in 1760, and present at Belleisle the same year. It was principally distinguished by its service in the West Indies, which included the capture of Guadaloupe and the successful assault on Cuba in 1762.

Major-Commandant George Byng was gazetted to the 99th, under date January 8th, 1761.

The 100th was embodied October 28th, 1760, and sent to the West Indies. In 1762 it was stationed at Martinique, where it became notorious for bad organization, and the inferior physique of the men. Major Colin Campbell, who commanded, was dismissed the Service by George III, in the same year.

The 101st also dated from October 28th, 1760; its Commandant was Major James Johnston.

The 102nd was the number of the Queen's Royal Volunteers, raised

in October, 1760. Major David Wedderburn, who brought home the colours taken at Kirchdenkern, was rewarded for the honourable service by the present of 100 guineas from the King, in addition to the command of the 102nd, under date September 25th, 1761.

The 103rd was raised October 28th, 1760, and was known as the Volunteer Hunters. The regiment was commanded by Lieutenant-Colonel Thomas Oswald.

The 104th King's Volunteers were commanded by Lieutenant-Colonel Patrick Tonyn.

The 105th was a regiment of two battalions, known as the Queen's Own Highlanders, commanded by Colonel David Græme.

The 106th, together with the regiments bearing the numbers immediately following, was not raised until 1762. It was styled the Black Musqueteers.

The 107th bore the title Royal Regiment of British Volunteers.

The 108th was better known as Sir Richard Hamilton's.

Of the remainder of these short-lived corps—

The 109th and 111th had no distinctive appellation.

The 110th was the Queen's Own Musqueteers.

The 112th, the King's Own Musqueteers.

The 113th, Royal Highlanders.

The 114th, Royal Highlander Volunteers.

The 115th, Royal Scotch Lowlanders.

The 116th, 117th, and 118th were Invalids.

The 119th was known as the Prince's Own Foot.

The 120th was commanded by Colonel Elphinstone.

The 121st, Colonel Gisborne's, was not disbanded until 1764, as well as the three following:—

The 122nd, Hon. Colonel Mackay's.

The 123rd, Colonel Pomeroy's.

The 124th, Colonel Cunninghame's.

The Fencible Men of Argyleshire, raised July 21st, 1752, commanded by Lieutenant-Colonel Douglas, appear in the Army List of 1762 without a number.

Gorham's Rangers was embodied as a regiment in America in 1761. Joseph Gorham was appointed Major-Commandant, with a regimental staff of 1 Captain, 2 Captain-Lieutenants, 6 Lieutenants, 2 Second Lieutenants, and a Surgeon. An independent company under his command had been in existence for some years, having been quartered at Halifax in 1754, and no doubt formed the nucleus of the regiment of light infantry which was disbanded in 1763.

In the same year four independent companies at New York, one at the Bahamas, and a regiment of free negroes, raised for service at the Havannah, were also disbanded, but these do not include all the independent Colonial companies, for 16 were in existence in North America in 1761, Governor Tinker commanded 2 at the Bahamas in 1758, and in 1761 the Governor of Jamaica had raised 3 independent companies of free negroes to suppress a rising there.

A large levy of cavalry was made in 1759. This included, besides the existing 15th Hussars, the 16th and 17th Lancers, which last

was raised as 18th Dragoons, and retained that number until the great reduction of 1763. The 17th Light Horse were commanded by Lord Aberdour with the rank of Captain, and officered under him by 1 Captain, 2 Lieutenants, and 2 Cornets. The regiment was disbanded in 1763.

The 18th Light Dragoons, raised as the 19th, a number they retained until 1763, had a history that extended over nearly sixty years. This regiment was raised in Ireland by Charles, Earl of Drogheda, who commanded it as Lieutenant-Colonel until 1762, when his command was raised to a Colonelcy, under date August 3rd. The regiment was not employed on foreign service until 1795, when it was ordered to Jamaica, sailed at a strength of 463 non-commissioned officers, trumpeters, and rank and file, and landed at St. Domingo, where the headquarters remained during the stay of the 18th in the West Indies. It was employed against the Caribs, and was brought home again in 1797. In 1799 two squadrons embarked at Deal for Holland with Sir Ralph Abercromby. This detachment served in the attack upon the enemy's position on September 17th, but was withdrawn from the Continent in November. In April, 1804, when it stood at a strength of ten troops, the regiment was ordered to Ireland. It returned in July, 1807, and in the following December the uniform and equipments were changed to those of Hussars. The tunics were light blue with silver lace, busby-bags blue, and plumes white springing from smaller red ones; the dolmans were furred with grey. In July, 1808, eight troops sailed for Portugal, landed there in September, and proceeded, under Lord Paget, to join Sir John Moore's army. These were present at Benevente, besides being engaged in minor skirmishes while forming part of the rear-guard during the retreat upon Corunna. They arrived home in January, 1809, and remained there four years. In 1813 six troops were embarked at Portsmouth for Lisbon, where, on their arrival in February, they were brigaded with the 10th and 15th Hussars under Grant in Sir Stapleton Cotton's cavalry Division. Two more troops joined in the following January, and the regiment served through the remainder of the Peninsular War. It was engaged at Vittoria, Morales, Sauroven, on the Nive, at Orthes, at the affair of St. Martin de la Touche, at Croix d'Orade, and at the final action before Toulouse. It marched homeward through France, and embarked at Calais in July, 1814. Early in the following year the eight troops were increased to ten. Six of these served through the campaign of 1815, and mustered 396 of all ranks at Waterloo. They formed a part of the Army of Occupation, and after the entry into Paris were quartered in the north of France, where two more troops joined from England. Brought home in 1818, and reduced again to eight troops, the regiment was sent to Ireland, where, in September, 1821, the 18th Hussars were disbanded at Newbridge. It is remarkable that Lord Drogheda, the only Colonel ever gazetted to the regiment, survived its reduction, dying in the following December.

A 20th regiment of Light Dragoons was incorporated in Ireland in 1760 by Sir James Caldwell, who was appointed Captain-Commandant.

It was raised in the space of three weeks in 1759. Captain Caldwell's regimental rank as well as that of his subaltern Officers—4 Lieutenants and 4 Cornets—bore date January 12th, 1760. In the Army List of 1762 the 20th appears under four local divisions—Fermanagh, Donegal, Cavan, and Londonderry, each officered by a Captain and two subalterns. The regiment was disbanded in 1763, after the Peace of Fontainebleau.

The Marquis of Granby and Lord Robert Sutton raised a regiment of Dragoons, numbered 21st in 1760, which was styled the Royal Foresters. Lord Granby ranked as Colonel, and Lord Robert as Colonel-Commandant, with a Lieutenant-Colonel, a Major, 6 Captains, 6 Lieutenants, and 6 Cornets. The Field Officers commanded their own troops, contrary to the practice prevailing in Dragoon regiments. The recruiting instructions for the Royal Foresters were minute and not devoid of grammatical confusion. "The Officers . . . . are to enlist no man under the size of 5 feet 5½ inches, nor above 5 feet 9 inches; the Officers must be very attentive to the kind of service the men are engaged for. They must be light and straight and by no means gummy. The bounty money must not exceed three guineas and a crown, but the Officers are to get them as much under as they can." The equipment and discipline of the corps, which never left England, was excellent. It was disbanded at the peace, when it consisted of 23 commissioned Officers, 1 (Surgeon's) Mate, 6 Quartermasters, 18 sergeants, 12 drummers, and 345 rank and file.

A regiment of Dragoons, raised for service at the Havannah, was disbanded in 1763.

With the exceptions noted above, all the preceding regiments raised since 1757 were disbanded in 1763; after this no large levies were made until the war with our American Colonies presented a problem that could be solved by nothing but strength of numbers.

Three independent companies of foot, however, raised for African service, date from August, 1765. These were amalgamated into a regiment in the following July under the command of Charles O'Hara, an Officer of the Coldstream Guards, and it continued to exist until 1783, when it was disbanded.

In 1765, also, the 73rd, 74th, and 75th Invalids were raised, all of which were disbanded in 1768, leaving these numbers a second time vacant. These three regiments probably absorbed the Independent Invalid Companies existing in 1760.

A Royal Regiment of Artillery was raised in Ireland in 1760 by James, Earl of Kildare, whose Colonel-en-second was Bernard Hale; 1 Lieutenant-Colonel, 1 Major, 4 Captains, 8 Lieutenants, and 8 Lieutenant Fire-workers formed his regimental staff. This regiment had an independent existence for many years, and served in the American War, but was eventually, in the beginning of the present century, absorbed into the Royal Artillery.

The first regiment raised after the declaration of war by our American Colonies was formed principally of discharged soldiers of the old 78th, that regiment of Fraser's which fought years earlier under the walls of Quebec. This was known as the Royal Highland

Emigrants, and subsequently numbered 84th. It served principally in Canada, and was engaged in the defence of Quebec in 1776.

Simon Fraser himself received the command of the 71st, the regiment raised next in order of time to the Emigrants, and known as the Fraser Highlanders. It embarked at Greenock for Boston April 21st, 1776, and arrived before the town in June, but the captain of the transport, ignorant that Boston was then in the possession of the rebels, ran her into the bay under the guns of the batteries, and she was compelled to surrender. In October we find the regiment defending Montresor Island, where it sustained a loss of 4 killed and 6 wounded. It was present at the capture of Savannah in 1778. One battalion was engaged at Briar's Creek, March 3rd, 1779. The 71st was also represented at Stone Ferry on June 20th, when two companies, detached to reconnoitre, advanced too far and were cut to pieces, only eleven men retiring. The two grenadier companies were taken prisoners at Stony Point, July 15th. The regiment was represented at Savannah, this time in defence, in October, and both battalions were present at Camden, August 16th, 1780, as also at Cowpens in the following January, and at Guildford on March 15th, where their valour was conspicuous. Thomas Sterling commanded the first and Lord Balcarres the second battalion when both were included in the surrender of Lord Cornwallis's army at York Town. The regiment was brought home in 1786 and disbanded.

The 72nd was at Gibraltar in 1779, and was in garrison there during the siege. This regiment was known as the Royal Manchester Volunteers, and had been raised within three months of the news of the defeat of the British at Saratoga, and at once sent to Gibraltar.

The existing 71st was raised as the 73rd about the same time. The 74th comes next in succession, commanded by Lieutenant-Colonel John Campbell. The regiment was present at engagements at Halifax and New York, and 450 of all ranks garrisoned a fort on the Penobscot, together with a detachment of the 82nd in 1779. It was known as the Argyleshire Highlanders. The 74th landed at Plymouth from Jamaica in October, 1872. "They were in a miserable condition," says the correspondent of the "Gentleman's Magazine," "going into the country to recruit."

Thomas, Earl of Lincoln, afterwards transferred to the 17th Dragoons, was Colonel of the 75th, which was styled the Prince of Wales's Regiment, and served at Gibraltar.

The 76th was commanded by Lieutenant-Colonel John McDonnell. This regiment served in America. It fought at Guildford and at James Town, and was a part of the force that surrendered at York Town in 1781.

The 77th was raised by the Duke of Athole in 1777, and sent to Ireland in June of the following year, where it was honourably distinguished by its conduct towards the disaffected Irish. At the end of three years the regiment was sent to Portsmouth for embarkation. The men having as they conceived only enlisted for three years were readily incited by factious malcontents to mutiny. They

refused to embark for foreign service, and their threatening attitude overawed the civil authorities. The rumour that a force was to be sent against them caused them to take up arms. Although the regiment had hitherto been exemplary in discipline it was now found impossible to persuade them of the good faith of the Government, and they were convinced they had been sold to the East India Company. After a consideration of the case, therefore, in Parliament, the Athole men were disbanded.

Lord Seaforth's Highlanders were raised as the 78th, but later renumbered 72nd.

The 79th Royal Liverpool Volunteers served on board the Fleet, and furnished a party for Nelson's attack upon St. Bartholomew's Island in April, 1780.

The 80th was styled the Royal Edinburgh Regiment. It was sent to America, and served there at James Town, July 6th, 1781, and in Arnold's expedition later in the same year. The Grenadier Company was at the action fought before York Town on October 16th.

The Honourable William Gordon (of Fyvie) received a letter of service for raising the regiment to be numbered 81st in March, 1777. Its strength was 980 of all ranks. Shortly after embodiment the 81st was marched to Stirling, and within a short time was embarked for Ireland. In 1782 the Government designed to despatch it to India, and the regiment was sent to Portsmouth for embarkation; but the Gordons, like the Athole men, refused to obey orders, and were sent back to Edinburgh, where they were disbanded in 1784.

An 82nd, known as the Duke of Hamilton's, was employed in America. Two hundred men were present during the defence of the Penobscot Fort in July, 1781. The 82nd was also represented at the action of Wilmington.

A thousand men were raised by the city of Glasgow in 1778, and formed into a regiment known as the Royal Glasgow Volunteers, or 83rd. This was present at the defence of Jersey in 1781. Colonel George Scott commanded the regiment at the time of its disbandment in 1784.

Lord Petersham raised the 85th, which was sent to Jamaica, but suffered so severely from the West Indian climate that it was found necessary to recall it after a short service. Lord Henry FitzGerald was Lieutenant-Colonel Commandant at the time. The service men were drafted, and the skeleton of the regiment sailed for England in the "Ville de Paris," a prize of Sir George Rodney's, which was lost on the voyage.

The 86th was distinguished as the Rutland Regiment. It was commanded by Anthony St. Leger, of Park Hall, the friend of Lord Rockingham, in whose honour the St. Leger sweepstakes were named. It does not appear that the 86th left England.

Lieutenant-Colonel Viscount Chewton commanded the 87th.

The 88th was not raised until 1780; as also the 89th, commanded by Colonel William Medows; the 90th, commanded by Loftus Anthony Tottenham; the 91st, which served for a short time in India; and the 92nd, disbanded in 1784.

The 93rd was embodied at Fort George in February, 1779. After occupying various quarters in England the regiment was sent north again in 1783 and reduced in numbers, but ten years later its strength was raised to 1,084 of all ranks. It served in Ireland in 1785, and was disbanded there.

The 94th, commanded by General Prescott, was raised in 1779, and remained embodied until 1789.

The 95th was in Jersey at the time of the French invasion of the island in 1781. General Pearson, but for whose exertions Jersey would have surrendered, fell at the head of the regiment. It was commanded by General Reed at the date of its disbandment, which was at the conclusion of the American War.

The 96th was raised and commanded by Richard White of the 24th Foot.

The 97th joined at Gibraltar during the siege. Colonel Staunton obtained the first command of the regiment under date April 10th, 1780.

The 98th was employed in India. Colonel Fullarton's appointment to it was dated May 29th, 1780. The regiment was on board the fleet, and engaged during Sir Edward Hughes' action with the French under Suffrain in 1782, and the following year was included in the disastrous surrender of General Matthew's army at Bednore.

Colonel Charles Rainsforth was gazetted to the 99th, June 3rd, 1780. He was succeeded by R. Skene in May of the following year, who cannot have held the command long, as William Gardner was Colonel at the time of the disbandment of the Jamaica Regiment at the close of the American War.

The 100th Regiment was raised August 5th, 1780, and commanded by the Honourable Thomas Bruce. It formed part of the defence column at Bednore that laid down its arms to Tippoo Saib, April 28th, 1783, and was afterwards treated with treacherous inhumanity.

The 101st was not embodied until September, 1781. It served in India, and was present at Cuddalore in June, 1793. The regiment returned home the following year.

The 102nd also served in India. Like the 98th and 100th it formed part of the defensive force at Bednore, which after being driven back into the citadel was compelled to surrender. Despite a full submission, the garrison was cruelly destroyed by the conqueror, who had expected to find vast sums of money in a citadel so desperately defended. General Matthew's offensive campaign into the Mysore was thus terribly revenged by the successor of Hyder Ali, against whose rule the English expedition had been originally designed, and his previous conquests of Onore, Mangalore, and other cities of the kingdom, the capture of which had been stained with cruelty, were wiped from the memory of Tippoo's followers by his treatment of the British regiments. He conveyed the Officers to Seringapatam, imprisoned them, and finally put them to death with torture. Colonel Rowley commanded the 102nd, which was formally disbanded in 1784.

The 103rd was on the Irish establishment. It was raised and

commanded by Ralph Abercromby, afterwards leader of the Egyptian expedition, under date November 3rd, 1781, and was distinguished as the King's Irish Infantry.

The 104th only dated from 1782. The command of the regiment was given to Major-General John Douglas.

The Volunteers of Ireland served in the American War as the 105th Regiment. Lord Rawdon who Commanded-in-Chief in Carolina, in 1781, and showed some skill in the conduct of the defensive campaign that followed Lord Cornwallis's retreat to Wilmington, was gazetted to the 105th in 1783. The regiment had previously served with him in Carolina, and was honourably distinguished at the actions of Camden, Hobkirk's Hill, Fort Sullivan, and Charlestown. After its return home the 105th was placed upon the Irish establishment and shortly afterwards disbanded.

The services of four regiments of cavalry were dispensed with at about the same date as those of the preceding regiments of infantry.

The 19th Light Dragoons were commanded by Russell Manners, a distinguished General Officer, who had formerly served in the Royal Foresters.

The 20th Light Dragoons were embodied in 1779 under the command of Major-General R. P. Philipson, afterwards of the 3rd Dragoon Guards. It was formed of the light troops which had for a time been attached to several regiments of Dragoon Guards.

The 21st Light Dragoons, raised and commanded by General Douglas in 1779, never left England. The regiment was quartered for nearly three years in the midland counties: when sent to Manchester in November, 1781, its strength was 360 of all ranks. From Manchester the 21st was moved to Colchester, and thence in July, 1782, to Lanham Camp. In November it proceeded to Canterbury, and remained there until disbanded on June 1st, 1783.

John, Lord Sheffield, raised a regiment of dragoons known as The Sussex, in 1779, which was numbered 22nd. His command was a Lieutenant-Colonelcy. He was succeeded in it on December 31st, 1782, by William, Viscount Feilding, and the regiment was disbanded the next year.

The 23rd Light Dragoons, better known as the 19th, had a longer history. The regiment was raised in 1781 with a commissioned staff of 1 Colonel, 1 Major, 3 Captains, 1 Captain-Lieutenant, 5 Lieutenants, 6 Cornets, and an Adjutant, and assembled at Bedford. It was formed of drafts from seven regiments of light dragoons, the existing 14th, 15th, and 16th, and the 19th, 20th, 21st, and 22nd mentioned above. Colonel Sir John Burgoyne pointed out in his first regimental order that the Indian Service, for which the 23rd was embodied, was "not less honourable than profitable." The two wings sailed from Portsmouth in the "Royal Henry" and "Ceres" in February, 1782. On their arrival at Madras the regiment was quartered in the lunettes of the fort, firelocks were issued, and a party of the men exercised in 24-pounder gun drill. Although held in readiness for active service during many months, it was not until May, 1784, that a wing of the 23rd joined the army in camp at Arcot, when at length the weather

had become favourable for operations in the field. In 1788 we find the regiment again in Madras as the 19th Light Dragoons. The change in number had taken place the previous year; and it was as the 19th that the corps was distinguished throughout its brilliant and arduous service in the East. It fought at Assaye, Vellore, and Seringapatam; later, in 1800, it was present at the action of Conaghul. In March, 1803, it was at Hurryhur, at a strength of 413, and in April the regiment marched from there to occupy Poona. On November 29th it fought at Argaum, and it was also present at the siege and storm of Gawilghur. Shortly after this fresh horses were purchased, and Major-General Wellesley mentions the 19th Dragoons in his despatches as "looking better than I have ever seen them." In February, 1804, the regiment was present, after a well-executed march, at the action of Muncaisir, when its loss was two men and three horses wounded. In December it was again mentioned in General Wellesley's despatches as looking "remarkably well" when in garrison at Arcot. The honour "Assaye" borne by this regiment for its share in the battle has been revived in favour of the existing 19th Hussars. It was not relieved in India until 1808. The regiment served in the Canadian War of 1813–14 in defence of our frontier; the honour "Niagara" was granted for the services of a squadron present there on July 25th. At Chippeway, July 5th, 1814, the regiment had covered and protected the disabled fort, and had six wounded.

To the numbered corps given above must be added four regiments of foot disbanded also about 1784, commanded respectively by Major Fish, George, Lord Strathaven, Major-General Waller, and Major-General Alford. All these were raised in 1781.

A regiment of dragoons was raised, probably in America, in 1782, whose chief was Sir Banastre Tarleton, the commander of the British cavalry during the War of Independence.

In 1782 forty independent companies were embodied for home service. Thirty-six of these, garrisoning different seaports in Great Britain and Ireland, were in existence in 1784, as well as five invalid companies in Ireland, whose constitution and employment seem to have been very similar.

A Newfoundland battalion, known as Major Pringle's, has September 20th, 1782, as its date of raising.

The King's American Regiment of Foot, commanded by an Officer named Fanning, dated from Christmas Day in the same year.

The Queen's American Rangers, although formed earlier, was not known by a distinctive name until 1782. The corps was originally raised about the commencement of the war, and the command given to J. G. Simcoe in 1777, after the battle of Brandywine. He was gazetted Major-Commandant in the following year, and shortly afterwards his command was made a Lieutenant-Colonelcy. This was a mixed regiment latterly if not originally, and at its disbandment consisted of three troops of cavalry and eleven companies of light infantry. Lord Henry Clinton praised it highly. "Its history under Simcoe's command," he wrote, "was a series of gallant, skilful, and

successful enterprises without a single reverse." The American Rangers were disbanded in 1783.

Within four years of the termination of the contest with America fresh levies were being made in England, although it was not until 1793 that another great effort became necessary to meet the requirements of a European war. In 1787 the existing regiments, numbered 73rd—77th, inclusive, were raised, and at about the same time the 20th or Jamaica Regiment of Light Dragoons was embodied for service in the West Indies.

To this corps, H. F. Gardner, from the 16th Light Dragoons, was appointed Lieutenant-Colonel Commandant. His Adjutant was promoted from the ranks of the 29th Foot. Major Sandwith, his next senior Officer, succeeded to the chief command on Gardner's death in September, 1792, and was followed by Sir Charles Grey, with whose name the services of the corps are chiefly connected. After service in Jamaica the 20th was employed on detachment duty both in Malta and Sicily. It was ordered to the Cape with Sir David Baird's force in 1805, but disembarked, as well as the 38th Foot, in Saldanha Bay, and did not share in the march upon Cape Town. A detachment of five dismounted troops was sent into South America, and these were at the assault of Monte Video on February 3rd, 1806; their position was in the rear in Lumley's brigade. The regiment was also represented the same year in Egypt, and fought both at Alexandria on March 31st and before Rosetta. The English force was withdrawn in September, and a detachment of the 20th, 300 strong, joined Sir Arthur Wellesley in Portugal in July, 1808, and served with distinction at Vimiera, where, to quote the historian of that war, "all the cavalry with the army was a squadron of 20th Light Dragoons under Colonel Taylor." After the success of General Anstruther's attack on the right flank of the French, this squadron was thrown forward in pursuit. Colonel Taylor, with the few horsemen he commanded, rode furiously amongst the confused and retreating troops, and scattered them with great execution. Unfortunately the ground was ill-adapted for cavalry, and this small body, led away by the ardour of pursuit, became entangled in difficulties; hemmed in and charged by a very superior force under General Margazon, their gallant leader was killed and the greater part of his squadron destroyed, though not until it had produced an effect upon the enemy greater than could have been expected from twice their number. The regiment also saw service on the south coast of France, and at Genoa, as well as in Sicily in 1810. One troop was at the affair of picquets there at San Stefano on September 18th. In this year the second Lord Heathfield succeeded Sir Charles Grey in the command. The word "Peninsula" was borne by the regiment on guidons and appointments, an honour which has been revived in memory of the old number in favour of the existing regiment of 20th Hussars. The Jamaica Regiment was disbanded in Ireland in 1818.

In 1789 an infantry corps was raised for service in New South Wales, which consisted of four companies, commanded by Lieutenant-Colonel G. Grose. This was taken on to the line in 1808 with the

number 102nd. It was brought home from Sydney in 1810, recalled in consequence of the part taken in the deposition of Governor Bligh. For his partizanship in this matter Lieutenant-Colonel Johnstone, who seems to have commanded the regiment at the time, was cashiered. A veteran company was attached to the 102nd in February, 1811. A few years later the regiment was employed in America. It was present in 1814 at the capture of Hampton and Passamaquoddy. Two years after the number was changed to 100th, and in 1817 it was disbanded.

In 1791 a regiment of four companies was raised in England for service in Canada, and sent out there with General Simcoe, the Lieutenant-Governor. This corps, disbanded in 1802, was the second regiment known by the name of Simcoe's Rangers. It appears to have been honoured latterly by the title of Queen's Rangers.

The year 1793 brings us to a period extending over several years, during which vast levies were made for service against France, who was already threatening the dynasties of Europe. Our war with her was divided into two parts by a short cessation of hostilities which followed the Peace of Amiens, but during the quarter of a century that succeeded the proclamation of the One and Indivisible French Republic, the Army of England was retained at an abnormal strength to oppose the encroachments made equally by the Government of the Democracy or of the Empire.

The line regiments numbered 78th—90th date from 1793, as did Colonel Campbell's 91st and Colonel Hewett's 92nd, both of which were disbanded in 1795.

The 93rd belonged to the same year; Colonel Balfour's commission was dated October 30th, 1793. He was transferred to the 39th Foot in August of the same year, and succeeded by Sir T. Shirley. In Shirley's time the regiment served in the West Indies. It was present at Demerara in 1796, and was disbanded the following year.

In 1793 the old Scots Brigade was brought on to the British establishment with the number 94th. The history of this regiment begins in 1568, when it was raised for service in Holland, and continued there on the pay of the States-General, serving with distinction for a century and a quarter. James II claimed its services for England in 1685, but after the suppression of the Monmouth Rebellion restored it to the Stadtholder, who, on his election to the British Crown, brought it over with him and held it here until 1691. For nearly a hundred years after this the Scots remained in Holland, but in 1793, when the Dutch Government called upon them to renounce their allegiance to the English King, the Officers applied to George III for their recall, and the brigade was placed upon the home establishment. In 1795 the four battalions of which it had consisted were reduced to two, which were sent to Gibraltar. Thence, reduced further to a single battalion, the regiment went in 1796 to the Cape, and on from there to India. It was present at the siege and storm of Seringapatam in 1799, and in 1801 was at the reduction of Tranquebar. During this and the next year it served in the Polygar War, and on December 25th, 1802, was brought on to the line as the 94th. The regiment

served in the Mahratta War. It stood at a strength of 1,013 at Hurrybur just before the advance, and formed part of the contingent Hyderabad Field Force, in which capacity it was present at Argaum, 29th November, 1803, at the siege of Guadilghur, and at Chandore. In 1814 it was in Guzerat serving with the Nizam of the Deccan. When drafted and sent home in 1807, the 94th had served longer in India than any Royal regiment had done up to that date. It arrived at home 130 strong, and the following year proceeded to Jersey. From there the 94th sailed for Portugal, but was sent round to Cadiz, and a portion of the regiment was employed at the defence of Montegorda. Recalled to Lisbon, the 94th served through the remainder of the Peninsular War in Picton's Division, and fought at Fuentes and Vittoria. On the conclusion of peace the regiment returned home, and was finally disbanded at Belfast on December 24th, 1818.

The 95th, commanded by Colonel Edmondstone, was raised in 1793 and disbanded four years later.

Colonel Murray's 96th, disbanded in 1796, and Lieutenant-Colonel Trench's 102nd, were also raised in 1793. This last was drafted into the 3rd Foot at Nursling in 1795.

The 131st, commanded by Hon. Colonel Fox, completes the levies of 1793. He was succeeded by Lowther Pennington, afterwards Lord Muncaster, and his regiment disbanded in 1796.

The levy of 1794 was very large. Of existing regiments the 90th, 91st, and 92nd (originally numbered 98th) date from it. The extinct corps, collected under the dates of their disbanding, were:—

Disbanded in 1795—

The 97th, or Strathspey Highland Regiment. This served on the Fleet with Lord Howe as marines. When broke the flank companies were transferred to the 42nd Foot.

The 101st, Fullarton's.

The 103rd, known as the Bristol Regiment. It proceeded to Ireland a few months after its raising, and was drafted there. Lord C. Somerset commanded as Lieutenant-Colonel.

The 104th, sent to Ireland and drafted into the 39th Foot at Spike Island. It was known as the Royal Manchester Volunteers, and was commanded by Major S. P. de l'Hoste.

The 105th, Forbes's.

The 106th, Major Bulwer's.

The 107th, Lieutenant-Colonel Keating's.

The 108th, Lieutenant-Colonel George, Earl of Granard's.

The 109th, Aberdeenshire, Colonel Arthur Hay.

The 110th, Lieutenant-Colonel H. O'Donnell.

The 111th, the Loyal Birmingham Volunteers, Lieutenant-Colonel T. Roberts.

The 112th, Lieutenant-Colonel Lord Donoughmore.

The 113th, Lieutenant-Colonel A. J. M'Donell.

The 114th, Lieutenant-Colonel Viscount Llandaff.

The 115th, H.R.H. the Duke of Gloucester.

The 116th, Campbell's.

The 117th, Hon. F. St. John's.

The 118th, Lieutenant-Colonel R. W. Talbot. None of these regiments remained embodied more than a few months.

Disbanded 1796—

The 94th, Colonel J. H. Hutchinson.

The 99th. It was first commanded by Lieutenant-Colonel Stuart Douglas, who was succeeded by William Gardiner. This regiment was in Demerara in 1796, and was not actually disbanded until 1797.

The 119th, Lieutenant-Colonel J. Rochfort.

The 120th, Lieutenant-Colonel H. Williams.

The 121st, Lieutenant-Colonel F. Macnamara.

The 122nd, Lieutenant-Colonel Hon. J. Stratford.

The 123rd, Lieutenant-Colonel E. Litherland.

The 124th, the Waterford Regiment, Lieutenant-Colonel Carr Beresford.

The 125th, Lieutenant-Colonel Trean.

The 126th, Lieutenant-Colonel the Earl of Mount Norris.

The 127th, Lieutenant-Colonel J. F. Cradock (afterwards Lord Howden).

The 128th, Lieutenant-Colonel J. Ogle.

The 129th, Lieutenant-Colonel Troughton.

The 130th, Lieutenant-Colonel Pigot.

The 132nd, Lieutenant-Colonel Cameron.

The 133rd, Colonel Fraser.

The 134th, commanded by Lieutenant-Colonel M. Baillie, in succession to Lieutenant-Colonel Lewis.

The 135th, the Limerick Regiment, Lieutenant-Colonel Sir Vere Hunt.

Six unnumbered regiments were also raised and disbanded at the same dates with these last. They were McDonnell's; Cameron's, the Loyal Sheffield; Podmore's, the Loyal Chester; Montgomerie's, the Loyal Glasgow; Pringle's, the Loyal Kelso; and Crosbie's, the Royal Dublin.

Blair's Liverpool Regiment, disbanded also in 1796, had not been raised until 1795.

Six regiments of foot, forming the Irish Brigade, belong to 1794. Each consisted of eight companies, and was officered by English subjects, and all were disbanded in 1797. Their Colonels were:—1. Le Duc de FitzJames; 2. Le Comte Walsh de Serrant; 3. Hon. H. Dillon; 4. Le Comte Daniel O'Connell; 5. Le Vicomte Walsh de Serrant; 6. Le Comte Conway.

In 1794 and 1795 the largest levies of cavalry took place that occurred in the course of the 200 years under review.

The 21st Dragoons, raised in 1794 and commanded by Lieutenant-Colonel Beaumont, proceeded to Ireland the following year, and from there were sent to the West Indies. Lieutenant-Colonel Mackenzie sailed in command of the regiment, which then stood at a total strength of 467, while Beaumont remained in Ireland to recruit three additional troops. On the arrival of the 21st at San Domingo it was employed against the natives, who had taken up arms and enrolled themselves under the banner of the French Republic. In an action

fought near the Fort of Meribalais on June 2nd a detachment of the regiment was highly distinguished. It was, however, lamentably reduced in numbers by the climate, and in 1798 mustered only 120 rank and file, of whom 96 were returned fit for duty. Shortly afterwards the 21st was sent home and stationed at Bridgnorth. Only 64 rank and file mustered in February, 1799, but in the following December the strength had been already raised to 384. The regiment was then sent to Ireland, and remained there until 1804 when it returned to England, sailing two years later for the Cape under the command of Lieutenant-Colonel Pigot, where it disembarked 770 strong. Two troops were sent to South America, but after the fall of Monte Video rejoined headquarters in 1807. In 1812 a squadron accompanied Graham's Expedition into Kaffraria. In 1816, 19 men and horses were detached to St. Helena, where they formed a mounted guard during the remainder of the Emperor Napoleon's captivity. In July 1817 headquarters proceeded to India, but the regiment was recalled in 1819, and disembarking in England marched to Chatham, where the six troops that had first sailed were disbanded in May, 1820, and the remaining two in June.

The regiment of Light Dragoons numbered 22nd was raised and commanded by William, Viscount Feilding, under date February 24th, 1794. His commissioned regimental staff consisted of 16 Officers.

The 23rd Light Dragoons were raised in 1794, and commanded by Colonel William Fullarton. This regiment took the number which had been vacant since the renumbering of the old 23rd as the 19th. It seems to have consisted of six troops, and was employed on home service until its disbandment in 1802 on the conclusion of the Peace of Amiens.

The 24th Light Dragoons were raised by Captain William Loftus, who was gazetted to the command as Colonel, March 20th, 1794. His regiment served throughout the period during which it continued embodied, in England. After its disbandment the vacant number was transferred to the 27th Light Dragoons.

The 25th Light Dragoons were raised March 9th, 1794, by Major-General Gwyn, served in India, and were renumbered 22nd in the year 1802. The regiment bore the honour "Seringapatam" for its share in the siege of 1799, and was present in the following year both at Malavelly on March 27th, and at Conaghul September 10th. For its services at the capture of the Fortress of Badanwy, the 25th was publicly thanked by General Monro. In August, 1803, when at Moodkul on the Kistna, its muster was 431. In 1806 the commissioned Officers were: 1 Colonel, 4 Lieutenant-Colonels, 2 Majors, 11 Captains, 23 Lieutenants, 11 Cornets, with Paymaster, Adjutant, Quartermaster, Surgeon, and two Assistant-Surgeons. The uniform was blue, with white facings and gold lace. The 22nd was employed in Java in 1811, and then returning to Hindostan was present at Maheidpore in 1817. It returned home the next year, and was disbanded in 1820.

The 30th Light Dragoons, Lieutenant-Colonel Sir J. C. Carden;
The 31st, Lieutenant-Colonel W. C. St. Leger;

The 32nd, Lieutenant-Colonel H. J. Blake; and
The 33rd, Lieutenant-Colonel Blackwood—were all raised in 1794 and disbanded in 1796.

The 26th, 27th, 28th, and 29th date from 1795. All of these regiments saw service in the field.

The 26th, better known by its second number as the 23rd, served in the West Indies and in Egypt. It was renumbered in 1803. As the 23rd it served with distinction in the Peninsula, and suffered so severely at Talavera in 1809 that it was brought home to recruit. It was in General Anson's light cavalry brigade, which, in conjunction with General Fane's heavy brigade, attacked the two French squares, defended by a ditch flanked by artillery. In this desperate charge, which was undertaken to check the French advance against the heights held by Lord Hill, the 23rd was nearly annihilated. It was later employed at Flanders, and was present at Waterloo. In 1816 the 23rd became a Lancer regiment; the commissioned Officers then numbered 42. The uniform was blue, with crimson facings and gold lace. The honours granted to the corps were "The Sphinx," "Egypt," "Peninsula," "Talavera," and "Waterloo." It was commanded in succession by General Russell Manners, 1795; General Floyd, ——; W. Cartwright, 1804; Sir W. Payne, 1807; H. Fane, 1814; and Sir George Anson. Disbanded 1817.

The 28th Light Dragoons were raised by Major-General Robert Laurie, and served at the Cape. This regiment was styled "the Duke of York's Own," and was disbanded in Ireland in 1802. Miles Stanlie had succeeded Laurie in the command.

The histories of the 27th and 29th, known later as the 24th and 25th, are closely connected. Both were raised in 1795, and both principally distinguished for service in India, where they often fought side by side. The 27th was raised by Major-General Blathwayte; he was succeeded in 1801 by Lord Dorchester, and Lord Dorchester in the following year by Colonel Loftus, of the recently disbanded 24th Light Dragoons. In August, 1803, the regiment was in the Doab, and present at the siege of Alighur, where its loss was slight, although the 29th suffered severely. Later on in the year it was at Delhi. At Leswarree on November 1st, the 27th had a loss of 5 killed and 43 wounded, with 88 horses killed or disabled. On the 17th of the same month the cavalry brigade, which included also the 29th and the existing 8th Hussars, surprised Holkar's cavalry at Furuckabad, with a trifling loss on the English side, and then rejoined the infantry of the army, which had fought the battle of Deeg, on the 13th, at Muttra. The brigade was present before Deeg from the 13th to the 24th December, but was not employed in the siege. The 27th and 29th had each a light field-piece attached to the regiment, presumably worked by a party told off and instructed for the purpose, as in the case of the 19th Light Dragoons, that were found very effective and frequently employed, among other occasions in a skirmish with the enemy's cavalry outside Bhurtpore, January 21st, 1805, where the 27th engaged a body of the enemy in defence of a convoy. On February 9th, in the same year, the cavalry brigade was despatched

in defence of Shir Khan into the Doab, and after following him over a large district, came up with him on March 2nd at Affzulghur. Here the loss of the 27th was 5 killed and 31 wounded of all ranks. The brigade then returned to Bhurtpore. Its next service was to pursue and engage Holkar's cavalry at a spot some distance south-west of Bhurtpore, which was effected with a slight loss. The 27th and 29th then went together into camp at Secundra. On October 28th they marched as a part of Lake's army to Delhi, thence to Ludhianah, and returned by Jullundur to Delhi in the following February. The "Elephant" and "Hindostan" were granted as honours to the 27th for its share in these services. It was not recalled from India until it was brought home to be disbanded in 1819. The uniform was blue, facings light grey, lace gold.

The 29th prefaced its career in Hindostan by service in the West Indies. This regiment was raised by the second Lord Heathfield, son of the defender of Gibraltar, and sent abroad at once. It served in some minor operations in San Domingo, and returned home in 1797. It was next sent to India, and was present at Alighur. After this engagement the 29th was detached to Shobabad and Agra in pursuit of the Mahratta cavalry. The total loss on this service was 12 killed and 19 wounded, with 24 horses killed and 23 wounded, besides 1 man and 27 horses missing. It suffered severely again at Laswarree, 19 killed, 45 wounded of all ranks, with 112 horses killed and disabled. The services of the regiment at Furuckabad, at Muttra, and before Deeg were those of the rest of the brigade mentioned above. On January 28th, 1805, the 29th had a skirmish with the enemy while escorting a convoy. It fought at Affzulghur, together with the 8th and 27th Light Dragoons, but the regimental casualties were confined to two Officers wounded. It was present at skirmishes on March 29th and April 3rd, and then went into camp at Secundra. In October the 25th Light Dragoons, as it had now become, marched with Lake to Delhi, and was in the field for four months. The regiment was next employed at the reduction of the Isle of France. The honours won in India, and borne upon guidons and appointments, were "The Elephant" and "Laswarree." In 1816 the regimental staff included fifty-two commissioned Officers. The successive Colonels were Francis Augustus, Lord Heathfield, 1795; R. Vyse, 1797; R. A. Welford, 1804; C. W. Lord Stewart, 1813. The 25th was disbanded at Chatham on its arrival from India in 1816.

Four West Indian regiments were embodied in 1795, the first two of which still appear in the Army List. These had originally twelve companies each, of which one or two were mounted. The cavalry was suppressed in 1797, and the number of companies reduced to eight.

The 3rd and 4th West India Regiments were raised at a similar strength and similarly reduced. Both were disbanded in 1819. The 5th and 6th, which resembled the above in strength and equipment, were disbanded in 1817; the 6th served at the defence of Honduras in 1798.

The 7th West India Regiment was disbanded in 1802, when its place was taken by the 9th.

The 8th was not raised until June, 1798. It had a strength of six companies, one of which was mounted. It was disbanded in 1802, and the number taken by the 11th.

The 9th, 10th, 11th, and 12th were raised in September, 1798. Though commanded in chief by Englishmen, the greater part of the Officers of these four corps were French, serving with temporary rank. The 9th was renumbered in 1812, and reduced the following year.

The 10th was reduced in 1802.

The 11th was renumbered 8th in 1802, and permanently reduced, as was the 12th, in 1803.

A regiment raised for West Indian service in 1795, and commanded by Lieutenant-Colonel J. Skerrett, took rank after the 7th of the same date, but was not numbered. This was reduced in 1796 or 1797.

A large number of foreign corps were in English pay during our wars with France, as appears under that heading in the Army Lists. Some of these were officered entirely by foreigners under an English Colonel, and some had a commissioned staff of mixed nationality. The following list of them claims to be approximately complete :—

The York Fusiliers, although they only existed as a regiment for a short time, must have been designed to stand at a considerable strength, as Lieutenant-Colonel Hardy heads a list of 2 Majors, 8 Captains, 18 Lieutenants, and 14 Ensigns, with a Chaplain, Adjutant, Quartermaster, and Surgeon. The Officers had temporary rank, dating from September 26th, 1794.

The Officers of Dillon's Regiment were French. This corps, raised in 1795, comes into the English Army List ten years later. It was disbanded in 1815.

De Rolle's was a Swiss regiment, raised in December, 1794, but first appears in the Army List in 1802. It was employed in Egypt, and bore "The Sphinx" and "Egypt" for its services in 1801. It was disbanded in 1816.

The Régiment de Meuron was raised 1795. It retained the name of its first Colonel after he had been succeeded by G. T. Walker. It first appears in the Army List in 1800. De Meuron's served in India; it was present at the siege of Seringapatam and through the Mysore campaign of 1801. Disbanded 1816.

The York Hussars were raised September 5th, 1794, under Lieutenant-Colonel Irwin. Two-thirds of the Officers were appointed with temporary rank, and eighteen of them were foreigners of mixed nationality. Colonel Wilford succeeded to the command in 1796, and shortly afterwards seems to have taken the regiment abroad, as in 1798 it was in the West Indies. In 1800 its strength was increased from eight to ten troops. In 1801 these were quartered at Horsham and Weymouth. The regiment was disbanded in 1802.

Major-Commandant G. Smith was appointed to a regiment of foot in Corsica in 1795. Most of his Officers were foreigners with temporary rank, and the corps seems to have been disbanded in 1797.

The regiment of mounted riflemen originally raised by Baron

Hompesch, and known by his name, was brought on to the establishment in 1796. It was in Ireland in 1798, and afterwards served in San Domingo and Egypt. It was brought over from Ireland and disbanded in 1802. Hompesch's Rifles furnished a draft of 400 men to the 5th battalion 60th Rifles, on its formation in the Isle of Wight in 1797. Sir Robert Wilson served as Major with Hompesch.

Officers, mostly foreigners, were appointed to a regiment styled York Rangers in 1796, but it is doubtful whether this corps was actually embodied.

The York Fencibles were in Ireland in 1798.

A regiment known as York Chasseurs seems to have existed prior to the date of the Peace of Amiens in 1802. It is related that the Turkish soldiers of this corps, conceiving that they had engaged as Officers, mutinied in Fort Ricasoli at Malta, and that by sentence of a court-martial twenty of them were shot at Floriana.

Lieutenant-Colonel the Hon. J. Brodrick was gazetted to a regiment April 12th, 1794.

Lieutenant-Colonel Ogle commanded a corps at the same time.

Colonel W. A. Villettes had a command known as the Albion Regiment of Foot, raised in April, 1799.

The Chasseurs Britanniques, a French regiment, was originally a portion of the Prince de Conde's Army of Emigrants. It was embodied in May, 1801, with Colonel John Ramsay at its head. Most of the Officers were foreigners, and those appointed earlier than November, 1803, held only temporary rank. This rifle regiment served in the Peninsula, whither it was sent from Sicily. Five companies are noted in the Wellington Despatches as arriving in November, 1810, having been detained at Cadiz on their way to the front. It was under Lieutenant-Colonel, afterwards Sir William, Eustace, that the corps attained distinction. He led the Chasseurs at Fuentes, at the siege of San Christoval, at Salamanca, at the capture of Madrid, the defence of Olmos in front of Burgos, through the skirmishes and actions of that memorable retreat, and finally at the actions in the Pyrenees, towards the close of the war. At Fuentes the regiment was on the extreme right. The testimony of the Commander-in-Chief as to its behaviour there is high. "I particularly observed the Chasseurs Britanniques," he writes, "under Lieutenant-Colonel Eustace, as behaving in the most steady manner." Eustace had troubles, however, in the internal government of his regiment. He enlisted, as the commandants of other foreign corps had done, prisoners of war and deserters from the French Army. The despatches state that desertions of twelve men in a single night were frequent in this and in the Brunswick-Oels corps, and shortly after the landing of the Chasseurs in Spain twenty-six men, enlisted at Cadiz from the remnant of Dupont's capitulated Division, deserted to the French. Wellington recommends that in all cases the French deserters enlisted in the Chasseurs should not be employed near the enemy. At the conclusion of the Peninsular War the Chasseurs served on board the "Ramilies," on the American coast. When first brought upon British pay the regiment consisted of eleven companies. It was disbanded in 1815.

De Watteville's German regiment was embodied in 1801. It served in the Mediterranean, and bore the honour "Maida" for its services at that battle in Sicily. In the war of 1813–14 it was employed on the Canadian frontier, when Lieutenant-Colonel Fischer, who commanded the regiment, had a brigade in which it was included. At the attack on the enemy's position at Snake Hill, August 15th, 1814, its loss was 34 killed and 27 wounded, while 83 men missing were supposed to have been destroyed in the explosion of the powder magazine that resulted on the assault. On September 17th at Fort Erie the regiment was again actively employed, and furnished additional gunners to the artillery. On this occasion Fischer and thirteen of his Officers were wounded. De Watteville's was disbanded in 1816.

A regiment of foot known as the Maltese Corps, Colonel W. A. Villettes, was raised December 7th, 1804, and may have been identical with the Royal Regiment of Malta, commanded in 1808 by J. Murray, whose successor was the Hon. J. Brodrick in 1809. This regiment was disbanded in the following year.

The York Light Infantry Regiment was raised in 1803. Its Officers were German and English under Sir Charles Green. It was a rifle regiment, and served in the West Indies. Colonel Hewgill succeeded Green in 1808. It was disbanded in 1818.

Major H. Lowe's appointment to command the regiment of Royal Corsican Rangers was dated October 15th, 1803. They served in the Mediterranean, and were disbanded 1817. They bore the honour "Maida."

The York Chasseurs, dressed and equipped as riflemen, were raised for West Indian service. The regiment, which was originally composed of foreign emigrants, deserters or prisoners, with some few English in the ranks, had a bad name, but improved in matériel and discipline as time passed on, and when renamed the Royal York Rangers was an efficient and well-conducted corps. It was sent to the West Indies in 1815, and disbanded 1819. The facings of this corps were red. Colonels Andrew Hay, H. M. Gordon, and Sir Denis Packe commanded in succession.

Major-General Campbell's Regiment of York Light Infantry Volunteers was serving in the Peninsula in 1811, but does not seem to have been identical with any of the above-named. In April of that year, Campbell stated in a letter to headquarters that he had fifty recruits from the enemy's army, and desired permission to send them to England.

To these regiments may be added a corps, partly officered by foreigners, and commanded by Lieutenant-Colonel Nicolay, which was ordered to be raised and attached to the Quartermaster-General's department in 1801.

The completion of this list has carried us some years past the commencement of the century, to which we return to continue the enumeration of British and Colonial regiments.

The existing 93rd and the Rifle Brigade, first numbered 95th of the line, date from 1800.

A regiment of infantry named, four years later, the Royal African

Corps, was raised in 1800. This seems to have been merged later in the York Chasseurs mentioned above, for its history leads to a second title, Royal York Rangers, a regiment that bore the honours "Martinique" and "Guadaloupe" when disbanded in 1819. As, however, this was the older corps it is equally possible that the York Chasseurs may have been drafted into the Royal African Corps, and the name changed on the amalgamation of the two regiments.

The Royal Wagon Train first appears in the Army List of 1800.

The 1st and 2nd Ceylon Regiments were raised in 1801. The first was commanded by Colonel Josiah Champagné, of a French refugee family, who had served in the 60th Foot. He was appointed in April, 1801, but the regiment was not numbered until 1807. It was a light infantry corps, and served in Hindostan in the earliest part of the century as Champagné's. In 1818 it was known as Ceylon Light Infantry, but a few years later appears in the Army List as the Ceylon Rifles, a name it retained until its disbandment in 1873.

The 2nd Ceylon Regiment, raised and commanded by Colonel Ramsay, served in the Canadian War of 1802. Like the 1st, it was a light infantry corps. It was disbanded in 1822.

The 3rd and 4th Ceylon Regiments, although raised some years later, may be mentioned here. The 3rd dates from 1804, and was numbered in 1807. Colonel Baillie was succeeded in the command by Colonel Thomas in 1810. It was a light infantry corps, and disbanded in 1817.

The 4th was formed in 1810, and disembodied in 1815. Colonel J. Wilson commanded.

Lieutenant-Colonel F. King was appointed to command a newly-raised Cape corps in June, 1801.

A Canadian regiment, commanded by Colonel T. Peter, dated from July, 1803.

In 1806 again, the first command of a Cape regiment was given to the Hon. A. Hope. His successors were Macdonald, Fraser, and Moncreiffe, but the corps was disbanded in 1817.

The Newfoundland Fencible Infantry, to which Colonel J. Skerrett was gazetted in 1803, received the affix Royal in 1806. It served in Canada during the war of 1813–14. The regiment supplied additional gunners to the detachment of Royal Artillery that accompanied General Procter's expedition to the Miami, and at the action of the 5th May lost three men. At the attack made upon Fort George by the enemy on 27th of the same month, the Newfoundland Fencibles lost 27 killed, and had 26 wounded, besides 26 missing. The troops fell back after the engagement. Later Fort George was occupied by the Americans, after a contest in which 2 killed, 9 wounded, and 19 missing was recorded as the loss of the Newfoundlands.

In 1803 a regiment, subsequently numbered 104th of the line, was raised in New Brunswick and Nova Scotia, and saw some local service. Thomas Hunter was the first Colonel. It was numbered in 1810. In the spring of 1813 the 104th performed an arduous march from Fredericton to Quebec, and on its arrival there the light companies were ordered forward to Kingston, which they reached on

April 12th. The regiment then mustered 550 rank and file in six companies. Later it fought at Sackett's Harbour, Lundy's Lane, and Fort Erie, and the honour "Niagara" was granted for the service there of its flank companies. The 104th was disbanded in 1817.

The 96th Regiment was formed in 1803 from the second battalion 52nd Foot. This served in Egypt, for which honours were granted, and then was sent to the West Indies, where it was present at the capture of Guadaloupe in 1810. In 1816 the number was changed to 95th on the removal of the Rifle Brigade from the line. Sir George Don was Colonel of the regiment at the time of its disbandment in 1818.

A Nova Scotia regiment was raised in 1803, F. A. Wetherall, Colonel.

Additional recruiting corps and garrison battalions had been raised a few years previously. In 1803 sixteen battalions of reserve were formed, which were renamed later Garrison Battalions, as well as the King's German Legion.

This consisted of three infantry battalions and a small force of cavalry. The Duke of Cambridge was appointed Colonel-in-Chief, but all his Officers were Germans. In the Army List of 1805 the Legion appears as a complete Corps d'Armée, consisting of a regiment of cavalry, 1 of light dragoons, 2 battalions of light infantry, 4 of infantry of the line, 2 companies of engineers, 7 companies of artillery, and a depôt company. In the list of 1806 the constitution of the Legion is again changed. It there shows as a force composed of 2 regiments of dragoons, 3 of light dragoons, 2 battalions of light infantry, 7 of infantry, and a corps of artillery. An eighth battalion of infantry was added shortly afterwards. In 1815 the dragoons have been re-equipped as light dragoons, and the light dragoons as hussars. The Legion was disbanded on February 24th, 1816.

The year 1804 added further to the standing Army. The Queen's Germans, a foreign corps, was brought in to the line as 97th. It served under Abercromby in Egypt, and through the earlier Peninsular campaigns. In 1816 it was renumbered 96th, and it was disbanded at Limerick on December 10th, 1818. The 97th bore "The Sphinx" and "Egypt."

The 98th, raised in 1804, was sent to America the following year, and later saw active service there. In the second American War, it was present at the capture of Custine in 1814. This 98th was renumbered 97th in 1816, and disbanded in 1818. Sir R. Macfarlane succeeded its first Colonel, Sir T. Burke, in the command in 1816.

The 99th changed its number similarly, becoming 98th in 1816. It was styled the Prince of Wales's Tipperary Regiment, and was disbanded in 1818. Viscount Matthew was its first Colonel.

The 100th Regiment dated from February 28th, 1805, when it was embodied under Colonel F. J. Falkiner at Dublin, as the Prince Regent's County of Dublin Regiment. It served in Canada, 1813–14, and bore the honour "Niagara." On the removal of the Rifle Brigade from the line in 1816, the 100th was renumbered 99th. It was present at the Isle des Noix, June 3rd, 1813, a naval engage-

ment, but *bateaux* containing soldiers were launched in support of the English fleet. The 100th behaved well under Major Taylor. At Chippeway, 5th July, 1814, the loss of the regiment was 70 killed, 134 wounded. It was disbanded at Chatham in 1818.

The 101st, or Duke of York's Irish, was commanded throughout its existence by H. A. Dillon, afterwards Viscount Dillon. His appointment was dated August 20th, 1806. The regiment served for some time in America, and was disbanded in 1817.

The 103rd, raised in 1805, was commanded in succession by Colonels B. Spencer, Sir Samuel Auchmuty, Sir Lowry Cole, and G. Porter. It fought at Lundy's Lane, Fort Erie, and Sackett's Harbour, and bore the honour "Niagara" for its defence of the Canadian frontier. It was disbanded in 1817.

The Royal West India Rangers were raised in 1806, and disbanded in 1817. Colonel Wynyard, who first commanded, was succeeded by the Hon. Sir W. Lumley.

The Royal Manx Fencibles were raised in 1806, commanded by Lord J. Murray. They appear in the Army List of 1811 at the end of the line regiments, and above the militia, in company with the Newfoundland Fencibles; so that neither appears to have been, despite the name, a militia regiment.

A second Royal African Corps was formed in 1808, under Lieutenant-Colonel W. Gordon, whose command was raised to a Colonelcy in 1810. He was followed by Sir H. Torrens. This regiment was disbanded in 1819.

Another Cape corps must have been formed after the disbanding of Colonel Moncrieffe's command mentioned above. In 1820 this new regiment consisted of a troop of cavalry and a company of infantry. These were increased the following year to two troops and four companies, and in 1823 it stood at a strength of four troops and four companies. In 1827 some reduction took place. In 1828 the regiment first appears as the Cape Mounted Riflemen, but the cavalry are ordered to be reduced. The regiment retained this new name until the final disbanding in 1870. In recognition of its services, it bore the honour "Cape of Good Hope."

In 1804 the Royal Garrison Battalions were reduced, and the Royal Veteran Battalions took their place. The Officers of the Royal Garrison Battalions went on the half-pay list—the larger proportion on the English, but four of them on the Irish half-pay. They did not, however, entirely disappear from the Army List, and the number of both corps, garrison and veteran, fluctuated during several years.

In 1810 the Duke of Brunswick-Oels's Corps came into the English list. This consisted of six troops of cavalry and twelve companies of infantry. The cavalry was disbanded in 1817, at the same time as the German Legion and the Foreign Veteran Battalion of four companies, which had been raised in February, 1813. The Staff Corps is noticed for the first time in the Army List of 1812.

In March, 1813, Colonel J. Coffin was gazetted to the command of the New Brunswick Fencible Infantry.

The Glengarry Light Infantry Fencibles are in the Army List

under date February 6th, 1812, commanded by Colonel E. Baynes. This regiment was engaged in the American War of 1813–14, serving in Canada. It fought at Ogdenburg very shortly after its formation, when its loss was 2 killed, 14 wounded. It was present at the engagement of July 5th, 1814, with a loss of 4 killed, 32 wounded, and many wounded prisoners; again at Fort Erie, 17th September of the same year. The Glengarry Fencibles were disbanded in 1816.

In 1813 the Bourbon Regiment was formed. It was a rifle regiment, the Officers English and foreigners, commanded by Lieutenant-Colonel S. Keatinge. It was disbanded in 1816.

After the conclusion of the war with France, and the subsequent dissolution of an immense number of our forces, no large enlistment took place, although at different times additions were made to the line, as in 1823, when the 94th, 95th, and 96th Foot, still existing, were raised, and also in 1824, a year which witnessed the embodiment of the 97th, 98th, and 99th.

For a very short time again, within the last thirty years, a British German Legion was in English pay. It comprised two regiments of light dragoons, three Jäger, or rifle corps, and six regiments of infantry.

The British Swiss Legion of the same date, 1856–57, with its depôt at Dover, comprised two regiments of light infantry.

The British Italian Legion included five foot regiments, raised between December, 1855, and February, 1856, one being a rifle regiment. All these continued on the British establishment for a short time only.

The 5th Lancers, 18th Hussars, and 100th Foot only date from 1858, and it is almost unnecessary to recall how in 1861 the incorporation of the East India Company's with Her Majesty's Army took place, which while it added nine regiments to the infantry and three to the cavalry of the line, and increased the Royal Artillery, made besides immense apparent additions to the "Army List." The Indian forces, however, like the Colonial regiments of a later date, not being borne upon the home establishment, do not come within the scope of the present paper.

The motto adopted by the Volunteers of 1859 promises to be the keynote of our future military policy, and Defence not Defiance, as it tends to diminish the army proper, suggests to our dependencies the extension of a system already established on a broad base. Territorialism has now a wider field than the British Isles, and Canada, once a large garrison of regular troops, will in future trust primarily for defence, like New Zealand, to local Militia or Volunteers.

This recalls one of the principal difficulties of a list like the present. In more than one case, and at more than one period, the distinction in constitution between local regiments raised on emergency and militia, is of the finest. More than one Fencible Corps has developed into a regular regiment, while militia have served without the restrictions implied in the original formation. For example, twenty-nine regiments of Fencible Light Dragoons were raised in Great Britain in

1794, each consisting of 6 troops of 80 privates. As Yeomanry they do not come within our limits, but not less than nine of these corps volunteered for service in Ireland, and the offer in each case was accepted. The Yorkshire Hunters and the Glasgow Regiment of 1746 again both saw active service, although in a contest that may be termed a civil war, but the organization of both resembled that of a battalion of Volunteers in our own day.

Once more, in the case of some of the Highland regiments and in that of many others raised between 1779 and 1783, the enlistment was for three years *or* until the conclusion of the war, a form of engagement which placed the corps in question on a somewhat peculiar footing, and any attempt to extend this term was met with mutinous resistance. To these limits the Highlanders added a special one—their service was confined to the United Kingdom. Such degrees of obligation form a continuous chain between regiments of the line and militia, which it has been necessary to sever in a somewhat arbitrary manner. The distinction drawn, and kept to as closely as possible, is that between regiments raised directly by authority of a Royal Warrant, or that having been raised independently were accepted by the Sovereign, and their Officers commissioned directly by him, the corps being placed at once upon the footing of a regular regiment, and those levied by the Royal Lieutenants—in brief between troops subject to, or exempt from, the conditions of the Mutiny Act; but even this rule has been stretched in the case of a few Colonial corps. Very slight reference has been made to the non-combatant corps, which, under different names of Garrison, Reserve, Recruiting, Train, or Staff, existed in some form for more than a century, only ceasing to appear in the Army List in our own day; but the irregularity of their composition, and the Protean changes which they underwent, make their history alike uninteresting and puzzling to the reader.

That the above list of extinct regiments is imperfect can be only too evident; that it is deficient in detail is inevitable to its conditions of length and treatment, for the subject is a wide one, and capable of almost indefinite expansion. It can only claim to be a *catalogue raisonnée*, and catalogues are disappointing in their inefficient preciseness, but it may have conveyed an idea of the warlike vigour of English feeling when encouraged by authority, and of the extent of the work capable of being achieved when that authority cared to employ the material at its command.

From a mere fragment of historical retrospect no deduction can be fairly drawn, and the old order changes too steadily for one generation to use similar means for the same ends as its predecessors; but we would willingly believe that the English of to-day are the inheritors of the moral as they undoubtedly are of the physical qualities of their ancestors, men who, beaten at Fontenoy, Conjeveram or Burgos, advanced to victory with only the greater determination at Dettingen, Porto Novo, and San Sebastian.

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Friday, January 21, 1887.

LIEUTENANT-GENERAL SIR EDWARD B. HAMLEY, K.C.B., K.C.M.G., R.A., M.P., in the Chair.

SUGGESTIONS AS TO THE USE OF MACHINE-GUNS IN THE FIELD, IN COMBINATION WITH INFANTRY.

By Major A. D. ANDERSON, R.H.A.

(Read in the absence of Major Anderson by Major H. L. HIME, R.A.)

The CHAIRMAN: Gentlemen, I beg to introduce to you Major Hime, who is about to read a lecture on behalf of Major Anderson, who has been suddenly called to India, and has not had time to revise what he had written. I am sure that under those circumstances you will grant to Major Hime your indulgence.

STUDENTS of military history cannot fail to recognize the importance to the *morale* of an army, and its consequent bearing on the results of the campaign, of the possession of an improved class of weapon or adaptation of some advance in tactics; as instance the massing of guns by Napoleon I and the introduction of rifled cannon by Napoleon III; use of breech-loading rifles; an extended formation of attack, and the application of the enveloping or flank attack by the Germans; while, at the present moment, we find the larger European armies keenly alive to the necessity of arming their troops with repeating rifles, so as not to embark in the next campaign at a disadvantage; all, however, for the present appear to hold back from the machine-gun, probably owing to difficulties in the mechanism of the weapon, and doubts as to its use, but we cannot but feel convinced that just as certainly as the needle-gun gave to the Prussians a decided advantage in the campaign of 1866, so will an intelligent and bold use of machine-guns operate in favour of the nation that first utilizes them in a future campaign.

The inefficiencies or faults in the weapon itself may be considered to have been overcome, and the mechanism that is found suitable and efficient enough for the Navy for both defence and offence, and admitted by military authorities to qualify it to be considered a necessary portion of the armament of fortifications and defensive posts, is not likely to be far amiss, if only properly handled, were we to decide on using machine-guns in the field for offensive as well as defensive tactics. The terrific power developed by these weapons effectually silences all detractation from their value as implements of war, while military writers speak of them with respect, but remark that some solution as to their efficient use and adaptation to the field tactics of the present day is necessary.

General Brackenbury writes: "But their advocates have never yet put forth a complete scheme, showing how they are to accompany infantry in the field, acting on the offensive over all sorts of ground, and this must be done before they can be accepted for that purpose."

This I would urge is what we are now in a position to do: evolve a scheme for working them in the field.

Having overcome the difficulties of construction, ammunition and such like, and thoroughly convinced ourselves of their shooting powers, it would, indeed, argue weakness were we to stop short in finding the method of utilizing all we have got, and allow others to be in the field before us; and it is with the firmest conviction of the tremendous force lying to the hand of the army that first intelligently uses these weapons in the field, that we venture to add the following few suggestions to what has been already ably written on the subject. Whilst these weapons have been struggling through their stages of early existence, undergoing changes, alterations, and improvements, time has been given us to study and consider the innumerable ideas and suggestions that have been put forward as to their use in the field; advocates are forthcoming for forming machine-gun corps, or for attaching them to artillery, cavalry, or infantry, but the consensus of opinion has undoubtedly arrived at the sound view, viz., that they be attached to infantry, and fire the same ammunition.

It is not necessary here to discuss why they should not become part of the artillery or cavalry, or be formed into separate corps, though for exceptional purposes they might do any of these, but a little thought will lead to the conviction that machine-gun fire should be a multiple of infantry fire, and that as a rule it must be worked in the closest combination and connection with it.

The points to be decided towards carrying this into effect are—

(*a.*) The transport of the gun.

(*b.*) The number, allotment, and working of them.

(*a.*) *The Transport of the Gun.*—When we consider what is aimed at, viz., the closest connection between battalions and machine-guns, that the latter shall be able to go everywhere with the former, at the same pace, for the same or a greater distance, and without entailing extra labour on the men, we realize that the guns should not be on wheels, and that they must not be moved by manual labour, and this of itself suggests to us that they must be worked on tripods and carried on packs. A machine-gun with spare pieces, implements, &c., would form the load for a mule, while a second carried ammunition, and the whole would thus be capable of being taken up and down the steepest hills, over the roughest ground, through narrow lanes, and practically everywhere that a battalion of infantry could go, at the same pace, and without fear of being left behind.

Mule transport offers no difficulty in packing and unpacking the loads, and one of the men (probably three or four per piece) told off to attend to the gun, would lead and look after the animals.

(*b.*) *The Number, Allotment, and Working of them.*—Opinions here will probably differ; some may be found to advocate their retention

under the Commanding Officer, and entire control by him; but all tend to prove that here, as in many other cases, "Decentralization" is the sound theory; place them with the different companies to the extent of one apiece, to be managed and manned by them and worked as company commanders deem necessary, the battalion commander having, as in all other points, the power of utilizing them or directing their use as he deems requisite. We thus ensure all the companies in the regiment taking an interest in their own gun, and training men for work with it; it is ready to the hand of the Captain of the company, not requiring to be sent for, or applied for, in the numerous instances when a company detached or in want of assistance would be thankful for its support, and very valuable would be the aid it would afford in nine cases out of ten, if worked by properly instructed men, pushed forward, and, if necessary, used and exposed as freely and boldly as a section of the company; while at any moment the battalion, brigade, or divisional commander would be in a position to order the whole or a portion of them to mass on some suitable spot in support of an advance, an attack, or threatened point.

As regards the class of gun, Gardner, Gatling, Nordenfelt, or Hotchkiss, we would leave that to those who have best tried all and each of them, while probably three or four selected men per company would be found equal to working them and attending to the mules, the company Officers looking after and controlling their own piece; and should the eight per battalion be called for by the Commanding Officer, one of the Majors or a senior Officer should be placed in command, the supply of ammunition, beyond the one mule-load per gun, being as for the remainder of the battalion, but on an increased scale.

The advantages hoped for from the addition of machine-gun fire to that of the weapons now in use are—

(*a.*) A murderously powerful fire.

(*b.*) Relief to the infantry, in furnishing for them a powerful support, and one admitting of their withholding their fire till the last moment.

(*c.*) Increase of volume of fire.

As regards the first of these points, there can be no two opinions of the terrific power of the weapon if accurately laid and worked; while in respect of the second, machine-gun fire fills up a blot in our tactics, in that long-range fire may be carried out by them, allowing infantry to advance to the attack taking advantage of all cover and without firing, and enable them to achieve what military writers and past wars show us to be of the utmost importance, viz., the retention of infantry fire till the last moment. This it was that in the Peninsula formed the difference between our and the French infantry; they opening fire at 800 and 700 yards, we at 400 and 300 yards.

Similarly the 1870–71 war taught the Germans that though the French opened fire at 1,400 and 1,200 yards, their best policy was to withhold their fire till 700 and 600 yards; and in like manner the Afghan War taught many of our commanders that though damage

could be inflicted on the enemy at 1,200 and 1,000 yards, they spared their men and brought them fresher and better up to the attack by holding the fire until within 500 yards.

So it will always be; given equal conditions, the commander who spares his infantry and brings them without firing and fresh, close up to the enemy, before launching them forth for the attack, and then opens fire from every possible rifle, will fight under immeasurably more favourable conditions than one who commences firing at long ranges and continues it throughout the advance.

Long-range fire is at the same time a very necessary portion of a battle; your enemy cannot be permitted unmolested to concentrate the whole of his rifle fire on your advancing infantry, and to harass him and endeavour to keep his fire under, you must do one of three things—

I. Devote one half of your infantry to long-range rifle fire.

II. Open fire with your infantry at 1,200 or 1,000 yards and keep it up throughout the advance.

III. Use machine-guns for long-range firing: of these three the last if efficiently performed has all and everything to recommend it, for it admits of the whole of the infantry going forward complete in the formations most suited to the locality, without firing a shot, devoting their whole attention to rapid advances, and gaining cover until within say 500 yards of the enemy, when the fire from the defence would probably necessitate a commencement of fire from those advancing; not that this need follow as a matter of course, for it is certain that in the majority of instances some feature of the country will admit of a point even nearer than 500 yards being gained without firing, especially when we bear in mind the volume of machine-gun fire that can be brought in support. This in the case of a Division at the rate of eight pieces per battalion amounting to 56 machine-guns, which, discharging at the rate of even 100 shots per minute, yield a shower of lead that if directed on the infantry of the defence from any moderately protected spot, at 1,200 or 1,000 yards range with any pretence at accuracy, will far surpass in effect what could be obtained from three battalions, in the same position, if withdrawn from the attack for this purpose.

All-important in the utilization of machine-guns is that they be placed in the hands of intelligent men, who have been given sufficient opportunities of knowing and practising with their weapons, in order to derive full value from them and save reckless waste of ammunition. The three or more men proposed for each piece should therefore be largely composed of non-commissioned officers, the senior of whom should be a sergeant; beyond this no special provision seems necessary or desirable, and if introduced, would only lead to needless expense. Twenty-four men might be added to the strength of battalions or drawn from the present establishment for this purpose as considered desirable, and a very much larger number would of course be instructed for employment if required. As it is proposed that each machine-gun should become portion of a company, and in the majority of instances be at the disposal of the company Officers, no increase of

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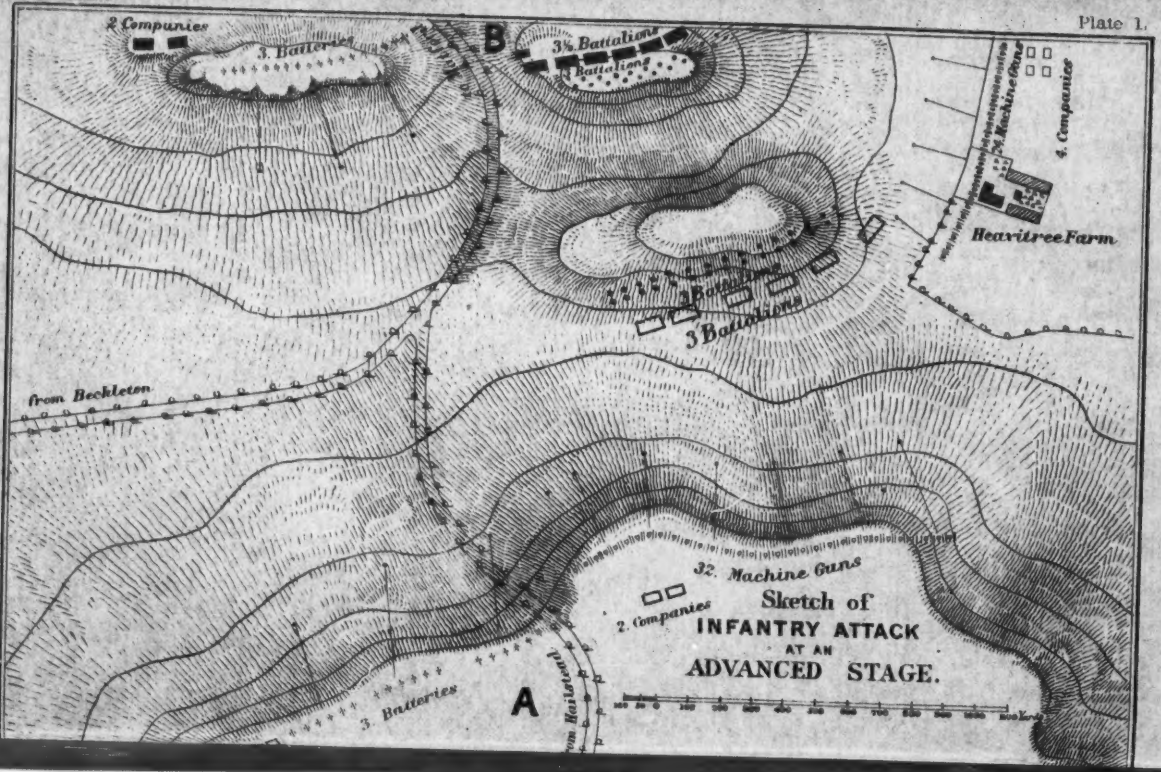
Plate 1.


2 Companies
3. Batteries
B
3½ Battalions
Battalions
2 Machine Guns
4. Companies
Heavitree Farm
3 Battalions
from Beckleton
32. Machine Guns
2. Companies
Sketch of
INFANTRY ATTACK
AT AN
ADVANCED STAGE.
3. Batteries
A

Officers is requisite, while if withdrawn by the Commanding Officer or higher authority for the purpose of being massed, a Field Officer or other competent Officer should be detached to command them and to return them to their companies on the completion of the duty.

If after trial it be found that more Officers are required with them, an increase of two subalterns per battalion should meet the case, attached to the two flank companies, with which they would remain until the machine-guns were ordered to mass, fall out with them and each undertake the charge of four, under the guidance of the Officer detailed to command them.

Regiments of infantry are not one Officer too strong for service, and could not afford to give them from present strength, should they be required. A little practice would require to be devoted to some simple system of manœuvring the mules, in order to guard against confusion when brought together in masses.

Probably sections of four guns (eight mules), worked much on the mountain battery drill principle, and only for movements of the simplest description, would be all that would be requisite, while during manœuvres they would join their own companies.

Let us now as an example imagine the case of two Divisions of all arms (A and B, *see* Plate) of equal strength, meeting on the march in ordinarily open country, and follow the course of attack of the one (A), whose infantry companies are strengthened by one machine-gun apiece, their opponents being without them, but to simplify matters consider that neither force uses any cavalry, as their presence is not requisite to prove or disprove the argument.

The Commander (A) having reconnoitred his enemy's advance resolves on attack, brings up his 18 guns to a knoll and opens on the opposing advanced guard, which falls back towards a ridge of hills it has just descended from, upon which its artillery having arrived are brought into action, range 2,000 yards, and an artillery duel from equal altitudes is commenced.

Commander A, owing to the fact that a succession of undulations leads towards the left of B's position, decides on advancing his infantry by the right of his guns, and leaving two companies on his extreme left as escort for the artillery, pushes the remainder forward towards B's left, having brought all the machine-guns under his own guidance. At 1,200 yards from B's position the reverse slope of a hill affording protection from possible fire from their opponent's artillery, a portion of the machine-guns (32) are halted with two companies in support and instructions to open fire on B's infantry just beginning to occupy the crest of the ridge and hedgerows below on the left of his position. The remaining six battalions make the best of their way forward, and now that the enemy's infantry fire begins to be felt, break into small columns or short lines and take every advantage of ground till they gain the shelter of a small hill facing the left front of B's position and about 400 yards from it; here a pause is made for rest and to complete the formation for the attack.

The remainder of the machine-guns, twenty-four in number, with

four companies in support, have at the same time been advanced to the extreme right, keeping out of range of infantry fire and occupying a favourable position behind a wall in the vicinity of a village about 100 yards from the enemy's extreme left, open fire on his infantry, and support with all vigour the attack about to be delivered by their own infantry.

The situation can now be described as an artillery duel at 2,000 yards' range, A's machine-guns, fifty-six in number, delivering a converging fire from two positions at 1,200 and 900 yards' distance, on B's infantry now formed on his left awaiting attack, A's infantry preparing to attack having suffered losses in their advance, but nothing in comparison to the damage that would be effected by the machine-gun fire, for B's movements cannot have been entirely under cover.

A's infantry when formed for attack should from this point deliver it in conformity with the present regulations, supports and reserves close up ready to merge in the fighting line almost at the start, and advancing by alternate rushes, open fire from the moment they expose themselves, throw all they can into the first line, and drive their onslaught home with determination.

B's infantry, to meet this, must expose themselves and offer a target to the machine-guns which would all this time keep up an incessant, and now that they will have found the range, a murderous fire.

This practically means that by the possession of fifty-six machine-guns A's infantry attack is stronger by a fire equivalent to that of at least three battalions, while the machine-guns themselves have nothing to really avoid beyond exposing themselves to artillery fire.

Should B hold part of his infantry and deliver a counter-attack from his right on A's guns, he runs the risk of being beaten in detail, and driven, by the attack on his left, off his line of communication; or should his artillery change their position or devote their attention to the machine-gun batteries or advancing infantry, they must be opposed at shorter range and energetically attacked by A's artillery, who, unopposed, would prove very formidable assailants; or again, should he resolve not to wait to be attacked, and move down the hill to oppose his assailants, he gives up the advantage accruing to him from his position, places his infantry on a par with his opponents, and enters on a tactical struggle with equal numbers, but weaker than his adversary by the fire of fifty-six machine-guns; the one course open to him would appear to be to withdraw behind the crest out of reach of his assailant's fire, but he thus leaves him free to, if possible, seize the crest of the position, and from thence open fire or occupy more advanced or commanding points from which a fresh attack could be delivered against him.

That the fire of a body of infantry would be immensely increased by the addition of one machine-gun per company does not admit of doubt, for by detaching three men to attend to the gun, the equivalent of the fire of at least fifty men is obtained, leaving out of the calculation the value to the battalion of being able to manœuvre up to a certain point without firing.

Machine-guns can as yet scarcely be said to have had a thoroughly impartial trial; from 50 to 100 picked shots are pitted against a machine-gun in the hands of men who have had it a few days or weeks, and who will certainly have fired very few shots from it; the result is, in the hurry, a jam occurs or the gun never gets on the target at all. The trial also should not be confined to the results from one gun, but from those of eight or, if possible, a larger number, so that if one or more miss the range and do not get on to their object, some of the others will; and the murderous nature of the fire is sufficiently well known to convince us that no formation of infantry could hold its ground, if exposed, under the fire of an accurately aimed machine-gun, the effect of which would be demoralizing; and we feel convinced that if justice be done to the weapon, the results must be very startling and convincing.

The correctness or otherwise of these proposals could with ease be tested by experiment on screens representing a battalion formed for defence upon which an attack should be delivered by a battalion advancing in every way under regulation conditions, opening fire from the first, and also an attack by the same body supported by eight machine-guns, who, occupying a position between 1,200 and 800 yards from the enemy, allowed their own infantry to approach to within 500 yards of the position, and then deliver its attack with combined machine-gun and rifle fire.

The result of the fire-trial cannot be doubted if the machine-guns be properly handed, while opportunities for their use by company commanders in detached positions, or working in any way independently, will occur in almost every phase of action; the one danger they have to avoid is artillery fire, and this, considering the mobility that would be attained by mule transport, and the fact that the weapons range up to 2,000 yards—thus offering a large selection of position—ought not to prove in any way an insurmountable difficulty; once in position and massed, machine-guns may be depended on to defend their front against all but artillery as certainly as would masses of guns; while if searched out, and suffering from artillery fire, their mobility is ample to admit of their being promptly moved over any country to a safer position.

It is with no dogmatic idea that this proposal will be found to be the best possible solution of the question, that these lines have been written, but in the hope that others may be led to consider and evolve schemes for the use of these weapons in the field, and with a firm conviction that the case is not being over-stated when we urge that "the nation which neglects to make use of machine-guns in the field will not only incur a heavy responsibility, but will undoubtedly suffer severely if opposed to them."

The CHAIRMAN: This being an unusually short lecture it is hoped that it will be followed by a large discussion. The subject is a most important one, and calls for careful consideration. I am sure that your valuable comments will be most welcome and serviceable.

General Lord CHELMSFORD, G.C.B.: I merely rise to give, as I have done on previous occasions, a lead to those who have perhaps come better prepared than

myself to speak on the subject. It is one that I take great interest in, and I think that we infantry Officers may congratulate ourselves that a paper of this sort emanates from an artillery Officer. When the question of machine-guns was first brought to the front, artillery Officers thought that they ought to have the weapon handed over to them, but I believe a better opinion has, after due consideration, come into their minds, and they feel that it is, as Major Anderson states, an infantry weapon, and should be an adjunct to an infantry battalion. With regard to the details, Major Anderson has evidently very carefully gone into the subject, but I do not think that we are as yet in a position to discuss that point. I shall be very glad, indeed, to see the trial made that Major Anderson recommends, because it is only by really testing the use of machine-guns in the way that he suggests that we can arrive at a conclusion as to whether they should be so used. My own impression is that their value would be greater in defence than offence, and although I do not for one moment deny that the advantage of machine-guns in covering an advance to an attack, which is of course the *crux* of all military manœuvres now-a-days, would be a very desirable one, I cannot help thinking that if machine-guns massed together open fire at 1,500 yards to support an advancing infantry, the artillery of the defence would knock them to pieces in a very short time. However, that is a point that I leave the artillery Officers here present to decide upon. Owing to the long range and accuracy of modern rifles the artillery are no longer able to give the same effective assistance to the defence as formerly, when the infantry used to look to them to open an effective fire of grape at the critical moment when the enemy's infantry were preparing for a rush upon the position. This can no longer be done by the artillery, but its place can well be taken by machine-guns. Seeing that their range is so deadly at that point where the attack would commence really to develop, namely, about 800 yards, I think that unless infantry are given these weapons to help them in the defence of a position they will be deprived of a very powerful ally. Whenever we take the field, we must necessarily, owing to our small numbers (if opposed to an European force), have to act on the defensive; I trust, therefore, our infantry may be furnished with these machine-guns in order to make up to some extent for want of numbers. I conclude by reiterating my sincere hope that the authorities will give our infantry the opportunity of showing that they are fit to be trusted with these weapons, and my firm conviction is that it would be a decided advantage to the Service generally that they should be entrusted with them.

Major HIME, R.A.: Mr. Chairman and gentlemen, I unwillingly rise to protest against the whole of Major Anderson's lecture, and to express my dissent from all that Lord Chelmsford has said. Major Anderson tells us that the great question is, who are to have the machine-guns, and he very truly observes that they have been claimed by the artillery, the infantry, and the cavalry. But he quite forgot to say that they have also been claimed by the Royal Engineers, in this theatre, on the ground that the Royal Engineers would do the machine-guns, as they do everything else, excellently well. But the fallacy of this argument is proved if you push it to the extreme; because it would lead to the utter absorption of all the Officers of the infantry, the artillery, and cavalry; and, in consequence, the British Army of the future would be "personally conducted" by the Royal Engineers. The question is who is to have the machine-guns. How that question arose it is difficult to understand. But the fact that it has arisen reminds one of a sentence in John Stuart Mill's book on Liberty, in which he says, "In this age the smooth surface of routine is as often ruffled by attempts to resuscitate past evils as to introduce new benefits." We all know that between the Thirty Years' War and the French Revolution the progress of field artillery was very much delayed by the system of battalion guns. This system of Major Anderson's is neither more nor less than the system of battalion guns revived with a new name. It was a bad system; it weakened the field artillery without strengthening the infantry, and it has been justly laid in the dust nearly a century ago. Yet this is precisely what Major Anderson wants to reintroduce; and I protest against it. The machine-gun is a piece of ordnance, and I think the French were very foolish to change the word "mitrailleur" into "mitrailleuse." First we had the "mitrailleur" of 1869; then it was called "mitrailleuse," and the man who worked it was called a "mitrailleur." It is a piece of ordnance, and the man who works it is a gunner. If you insist on the

definition of "a piece of ordnance," I presume it is this:—A fire-arm that is too heavy to carry on one's shoulder; and gunners consequently are the proper people to work them. You contravene the great law of the division of labour if you try to convert an infantry man into a gunner; for these three or four men who are to work the machine-gun, what are they but gunners in disguise; gunners with red coats on them; but after all real gunners? The machine-gun, no doubt, is a most important element in modern war; but unless you are going to seriously diminish the great advantages that may accrue from their use, you must give them to the people who understand how to work them; and that is the gunners. I have nothing more to say.

The CHAIRMAN: Will you give us the benefit of your opinion, General Olpherts?

General OLPHERTS: Really I have no opinion to offer. I never offer an opinion unless I think it is of any value.

Colonel EARDLEY WILMOT: I might ask the artillery this question, whether, seeing that the machine-gun has a range of 2,000 yards, and artillery has a range of from 6,000 to 8,000 yards, would it not hamper the artillery, if the machine-guns were attached to them? Another thing I should like to say with regard to the lecture is this. It seems to me very doubtful if a battery of machine-guns could protect its own front. A line of skirmishers would soon capture a battery of machine-guns if it were not protected by a large body of infantry. Their power of traversing is very slight; they can pour out a stream of bullets in one direction only, and a body of infantry circling round could easily take them at a disadvantage. I have seen the machine-gun at Aldershot worked in the open, and I think a company would have had no difficulty in putting it out of action and capturing it directly.

Sir WILLIAM OLPHERTS, V.C., K.C.B.: Sir Edward Hamley, when you kindly suggested that I should say a few words a minute ago I was quite unprepared to do so. It was by a mere accident that I heard of this lecture, and I have come down here to learn, not intending to say anything myself. But with regard to the question as to which arm of the Service should have the machine-gun, I only wish to say as an old artillery Officer that I do not think that is a point that ought to trouble us in the least. I think we should all be one in these matters. In the Mutiny I was very short-handed at starting with my battery, and at the end of it a great portion of that battery was composed of men of the cavalry and infantry. They had all their different uniforms in my battery. There was a man of the Highlanders in the highland costume and men of the Military Train and other regiments in it, and really I was as much indebted to the infantry as to anyone else, and if it had not been for them I could not have worked my battery. I am, therefore, perfectly convinced that if the infantry take charge of these machine-guns they will do them justice, just as I believe the artillery would as far as they have got the means of doing so. But we ought not to separate one arm of the Service too much from the other, and I would rather see them more linked together, and if the machine-guns will help to do this, by all means let it be used in any way you like.

Colonel BAYLIS: As a Volunteer Officer I hope you will not consider it presumption on my part if I offer a few remarks. Major Anderson rather assumes that the machine-gun will be so useful in the field to support infantry that it ought, if practicable, to be adopted, and he quotes the words of General Brackenbury, who says, "But their advocates have never yet put forth a complete scheme *showing how* they are to accompany infantry in the field acting on the offensive over all sorts of ground, and this must be done before they can be accepted for that purpose." I think we may say that Major Anderson has assumed that these machine-guns would be useful if you could have the transport for them, and you will find that he puts forward the mode in which he recommends the transport. I think we are indebted to Major Anderson for suggesting a mode in which those guns might be conveyed. He alludes to the different kinds of machine-guns, and then he says they might be conveyed by means of mules, the transport not to be by manual labour but by the assistance of packs. If that is a new suggestion I am not aware of it, as I have always understood that mountain batteries were carried on mules in that way. I suppose they have no wheels, but whether they carry wheels on mules or not I do not know, but what I understand from Major Anderson is that in the case

of these machine-guns, wheels are to be dispensed with altogether. If the machine be portable it may be useful. There are times when, as has been observed, the skirmishers would very soon destroy the efficiency of the machine-guns, but there may be positions in which these guns, if they did not take too many men to serve them, would be extremely useful for attack. They might be extremely useful in defence also, because they might be placed in a position where they could check a pursuit in the case of a retrograde movement. I understand that Major Anderson suggests that these guns would be useful adjuncts as they would require the same ammunition as the infantry, so that there would not be two sorts of ammunition; and the ammunition carried for these guns would be available for the purposes of the infantry with their rifles. That seems a very important consideration, because one knows what the waste of ammunition is from the great evil of distance and impetuous firing; the tendency of the introduction of repeating rifles will be to bring men into action at long ranges instead of leaving them to reserve, as much as possible, their fire for shorter ranges. I think machine-guns might be useful, or if not wanted, the same ammunition would be available for the infantry when they have not the means of carrying sufficient ammunition for their rifles. I do not know whether I have been rather intruding in making these remarks, but at the same time it occurred to me that the mode of transport suggested by the lecturer might make machine-guns extremely useful in combination with infantry.

Major HIME: I think the last speaker quite forgot two most important points. The first is, that mules are mortal; and the second, that Major Anderson will permit no wheels. If the mules are shot, and you want to move your machine-guns, it is for others to tell you how they are to be moved.

A MEMBER: I think the worst thing that would happen in that case would be that the guns would be put out of action; instead of having a battery of seven guns you would have only six.

Colonel RICHARDSON, R.A.: It seems to me that, to a certain extent, this is all a question of economy. I doubt very much whether there are any infantry Officers here who would prefer to have twenty of their infantry men replaced by one of these machine-guns, or think that they would thereby do much more execution. You try to make two or three infantry do the work of twenty or thirty. It may be that the nation cannot afford a proper supply of infantry, then we shall have to take to machine-guns, but it seems to me that with all this mule transport, the expense would soon be greater than would be the supply of an equivalent number of infantry, and there can be very little doubt that mules might be very much better employed in bringing up ammunition for these infantry. If the infantry Officers seriously prefer the machine-gun to the breech-loader then I think it is time for them to adopt the machine-gun. As an artillery Officer I am sure they are quite welcome to them as far as I am concerned. I hold that machine-guns are merely a cheap substitute for more expensive artillery; for field guns are more effective than machine-guns at all ranges. No doubt that in the defence of flanks, or when they can be kept out of the way of fire, to a certain extent the machine-gun will economize infantry, so that it is simply a question of economy, but history shows that it is dangerous to attempt to substitute machines for the proved value of the infantry man.

Colonel MARKHAM, R.A.: Mr. Chairman and gentlemen, I think we may assume from what has fallen from several speakers that what Lord Chelmsford has stated about this lecture is not quite in accordance with the views that they entertain as to machine-guns being an infantry arm. I think it quite a matter of opinion myself, although I am an artillery Officer. The question is really as to the transport of the gun. I think Major Anderson's idea was that the machine-gun should always travel with the infantry in the attack, but I can hardly believe that when infantry come to close quarters, the machine-gun will accompany them; it will have to be left somewhere, it can hardly go under a hot fire when the infantry come to close quarters because the mules are but mortal and will become ineffective. I think myself if the machine-gun is to be used, and there is no doubt it is a most useful arm, it should be upon wheels; if it is upon wheels, I believe it should be in batteries. The organization of the batteries is another affair. I think a number of machine-guns should be placed as a battery which would be under the General Officer commanding the

division, and when an attack was ordered by the infantry, no doubt the machine-guns would be ordered to move to a certain position, and they would get to those positions far more quickly on wheels than on mules. Then with regard to their being in the field without supports and fought by themselves, I can hardly think that. Every battery has to be supported in the field, and I cannot conceive that a battery of machine-guns would be left unsupported by itself any more than a battery of field guns. It is merely a matter of transport. If they are on wheels, they become I think an artillery arm; if they are on mules, they become an infantry arm. But I do not think that is the point. The great question is, if the machine-gun is brought into the field, how it is to be tactically used, and I really think we are able to do it best upon wheels.

The CHAIRMAN: I am sorry the discussion has not been more ample, because there is no subject, I think, which can be more properly discussed in this room than the present one, for war is every day becoming more and more dependent on the inventions of science. And how to turn these to advantage is important to all nations, but more especially, I think, to ourselves, and for this reason, that while we cannot pretend to compete in numbers of men with the formidable armies of the Continental Powers, yet on the other hand we are credited with being able to afford to buy expensive equipments in greater degree than they can, and therefore whenever it is possible to substitute material means for men, it would appear to be so far a distinct advantage to us. If, therefore, machine-guns can be made to take the place efficiently of certain proportions of men, why that is a matter upon which a British Government may congratulate itself. Now this is by no means the first time that this subject has been discussed in this Institution, but I think that hitherto the view has been taken that the machine-gun should be used on the side of the defence, and it is perfectly evident that if a force in position can be aided by a number of these machines, which would sweep the avenues of approach to the position, it so far possesses a very great advantage. But now we have the fresh proposal to enlist it on the side of the attack. Well here again I think it is indisputable that provided two forces, otherwise equal, are face to face, and the one that attacks can succeed in bringing up a line of machine-guns at such a distance as to bear effectively upon the enemy's position, an immense advantage will be gained in thus covering the otherwise very difficult attack of the infantry. Well I think that it was hardly necessary perhaps to enforce this view with argument; I think we are all ready to admit that in the case I have imagined, that of having brought the guns efficiently to bear, they must be of the greatest advantage to the force which possesses them. Major Anderson enforced his argument by an illustration which you see on the map behind me. Now I cannot help thinking that if Major Anderson had had a little more time to think the matter over, he would have strengthened his case very much, for I can hardly admit that that illustration is a correct view of what might happen. For example, I do not know what the commander of the force attacked would be about to allow the other to manœuvre at its will and pleasure around him, and to bring on to his flank that line of machine-guns which is enfilading it. I should suppose that he also would exercise his power of manœuvring, and it is obvious that he would take the ordinary precaution of keeping a battery in reserve, and that that battery might very properly have been made to enfilade the wall behind which the assailant's machine-guns are supposed to be, in which case they never would have got there at all. It would be more satisfactory that some problem connected with machine-guns should be worked out on the Kriegspiel. It would be a novel and interesting use to make of the game, and I think we might get some better result from it than the illustration we have before us. There is one important point I should like to touch upon. Major Anderson proposes to attach a machine-gun to every company. It is to be carried on a mule, and that mule is to be accompanied by another with the first supply of ammunition: that would be sixteen mules per battalion which must be always up with the battalion. This is all he says, so far as being explicit as to transport, but he tells us the one mule-load must hereafter, in the course of the action, be supplemented, like the infantry, by more ammunition, only in an increased degree. Now the whole question turns very much upon the increased degree of supply of ammunition. I do not know whether any exact calculation has been made on this subject, but I find it stated in a lecture given here by Lord Charles

Beresford that a Nordenfelt 10-barrelled machine-gun can fire a thousand rounds in a minute, and he also says—I do not know whether it is his own opinion or whether he is quoting another—that the proper supply of ammunition to each gun in the field should be 10,000 rounds. Now we must remember that the whole value of the machine-gun consists in its being able to pour an immense volume of bullets over a given space in a given time. A great number of these bullets will fail to hit, but then a great number will reach their mark. In proportion as you diminish the supply you diminish the value of the machine-gun. If you say I will only permit it to fire so many rounds in the minute, in that degree you impair it as a weapon. Supposing this estimate to be correct of firing a thousand rounds in a minute, the whole 10,000 rounds might be fired away in ten minutes. In the same lecture, a mule was supposed to carry 600 rounds of ammunition in cases, but I find in an estimate for a foreign army that quantity is very much increased. We will suppose that the mule could carry 1,000 rounds. You will see you must then have eleven mules following every company, eighty-eight mules for the battalion, and a very large increase of transport for the division. How far this might be practicable is a very important element of the question, and until we have that thoroughly sifted, we have not got the means of determining any point I may say connected with the matter; we cannot say how many guns would be capable of following a battalion into action. That therefore is a matter that I hope will engage attention in future discussions on this subject, namely, the proportion of transport that will be required to follow a battalion if they are entrusted with guns to this extent. Now I do not feel myself the same jealousy at entrusting them to the infantry which has been expressed by Major Hime, and for this reason, that we must remember that the machine-gun after all is only taking the place of the infantry arm, that is, merely so many rifle barrels discharging rifle ammunition, and therefore the control of them may properly, I think, be entrusted to an infantry commander. But this is a question which should rather follow upon the conclusions we might come to after a fuller discussion of the matter, in which these elements which I have endeavoured to indicate would be considered. At any rate I dare say we are all agreed in this, that the weapon is one of great value; that it would be of much advantage to the side which should succeed in bringing it on to the field of battle; and that if one army possessed it another which should enter the field against that army would find it necessary, in order to fight on equal terms, to provide itself in the same way. As then I believe many foreign armies are already beginning to equip themselves with machine-guns, it seems almost inevitable that we should in some early future war see them brought into the field. Whatever our opinion may be, I am sure you will agree with me that we are very much indebted to Major Anderson for starting this discussion upon a subject of this importance, and that we are obliged to Major Hime for having been so good as to read the lecture, and that we hope he will convey the thanks of this meeting to Major Anderson for having taken the trouble to put his ideas into form and to present them to us.

Friday, January 28, 1887.

ADMIRAL SIR EDWARD G. FANSHAWE, K.C.B., Chairman of the Council, in the Chair.

A FEW REMARKS ON NAVAL STRATEGY, WITH THE OUTLINE OF A GAME FOR ITS STUDY IN TIME OF PEACE.

By Lieutenant W. C. H. SNELL, R.N.

(Read in his absence by Captain P. H. COLOMB, R.N.)

I FEAR that many will consider it presumptuous for an Officer of my standing to write on a subject so important, still more so to lay down rules for a game which is intended for practice, in peace-time, of this important art. That there may be naval strategy as well as military no one can deny, in fact, readers of naval history cannot but have remarked British failings in the art in the great naval wars of the past; failings which would have cost the country dear had not the indomitable pluck and endurance of our seamen, and the great tactical skill and bravery of their leaders and their Officers neutralized a preponderance of force that the superior strategy of our enemies nearly always managed to have on their side. However, in the hope of doing a little good, I am willing to bear the odium of my presumption, and, moreover, I am in great hopes that my ideas may stimulate abler and more experienced hands.

In the old days, before the introduction of steam as a motive power, naval commanders could never rely on any desired movement of their ships being carried out, to, or even near, any date; head winds, calms, or storms would thrown out any calculation; of course, it was the same for both sides, but still it threw such an element of chance into the strategy of the past as to make it a less important factor than it will prove in the future. Nowadays, Admirals know their ships' best speed, average speed, most economical speed, and coal capacity, so can judge certainly to a day, almost to an hour, the time at which any ship will arrive at the place to which he has sent her; but to counterbalance this great advantage there is an element of weakness. Ships now carry an essential agency of their motive-power within them, and since space is required as much now as in old days on board, for crew, armament, magazines, &c., the space allotted to that essential agency is necessarily limited, in most cases too limited; because while introducing the new motive power into all our ships, we have kept the old as well in most of them. The old motive power requires very considerable space in sail-rooms, store-rooms, &c., which might with great advantage be turned into coal bunkers, while the weight of topmasts, topgallant masts, lower topsail and other

yards with their necessary rigging, would allow an excellent equivalent in three armoured tops, with machine and quick-firing guns complete, to be fitted on the lower masts. However, that is somewhat apart from the subject, though the coal capacity of our ships bears very heavily upon it. It is not of the slightest advantage to an Admiral to be able to concentrate twenty ships at a certain place to arrive there to an hour, if they arrive short of coal without the means of replenishing; calculation of consumption of coal and means of refilling empty bunkers enter therefore largely into the strategy of naval war. Again, referring to the naval strategy of the past, naval commanders in those days suffered under another disadvantage compared to the present, viz., means of learning the movements of an enemy, and sending intelligence and orders to friends.

We read in James's Naval History that in the spring of 1794 "the British Channel fleet, although it had lain at anchor during the winter months, was ready for a start the moment intelligence should arrive from the numerous cruizers off the French coast that the Brest fleet had put to sea." Now, these numerous cruizers if they had seen the Brest fleet go to sea had got to go back to St. Helen's with the news, under sail, perhaps against a head wind, a two or three days' trip. Again, quoting from James, 1805, "On the 3rd June Lord Nelson gained for the first time certain intelligence that the combined fleet was in the West Indies." Yet M. Villeneuve left Cadiz on the 9th April, arriving at Martinique on 12th May. A little earlier we read that H.M.S. "Leviathan," off Cagliari, on 16th April, gets news of the French fleet having passed the Straits of Gibraltar on the 8th, eight days old. Now, an Admiral has but to keep touch with a telegraph station by means of a despatch or other vessel, and news will not take as many hours in reaching him, as it would have taken days in the old time. There is again an element of weakness in telegraphy as applied to naval strategy, one that requires to be carefully guarded against on one's own side and taken advantage of against the enemy. We know the good service which the Prussian Uhlan did on shore for his cause, in cutting or tapping telegraph wires in 1870–71. There will be naval Uhlans about in the next great naval war, and ships will grapple for, raise, tap, or cut cables wherever they can do so for the good of their cause, and there is no cypher in existence or possible to be made, that cannot be decyphered by experts in a few hours. This, then, is the weakness alluded to. Our telegraph cables must be guarded, and spies must be kept out of our telegraph stations, or telegraph lines will become worse than useless.

Successful naval strategy may be summed up as the concentration, at the right time and place, of a force superior to that of the enemy. In military strategy it is sometimes good to seize and hold a commanding position with a force smaller than that of the enemy, releasing the surplus for other work; but at sea we have no commanding positions, nor is even the weather gage left us, though that of course was more a tactical than a strategical advantage. Certainly a small force may take refuge in a harbour and protect itself with torpedoes, booms, nets, &c., against a superior force, but that is a

loss from a strategical point of view so long as they are so blockaded, as the services of those vessels are lost to the open sea, their proper field of action in time of war; for it is submitted that the defence of harbours and coaling stations should be entirely left to coast defence vessels, land fortifications, mines, and torpedoes.

To effect a successful concentration there are then many things to be thought of and studied, and the naval commander who in war makes the best arrangements for receiving and dispersing intelligence, for keeping the bunkers of his ships filled, for the guarding of his lines of communication with a rapid perception and quick execution of where and when to be there, will be rewarded by finding himself in a position to gain a certain victory, if his tactical skill and the support of his subordinates are in the least commensurate with the skill he has shown. But this strategical skill must not be confined to the Admiral, for every Captain, Commander, and Lieutenant in command may be called on at any moment to show his—for he may get authentic and important news which does not reach his chief and which calls upon him to act upon his own—judgment promptly. An illustration of this occurred not many years ago. A Captain commanding a fine frigate homeward bound arrived at either St. Helena or Ascension, and heard of a disaster to the British arms in Zululand, and promptly—on his own responsibility—turned his ship's head southward and arrived near the scene of action in time to allay the feverish excitement of alarm and imbue fresh confidence in the breasts of the colonists on the border and everywhere. That was simply a question of "go home" or "go back" to be decided on the Captain's responsibility; but much more complicated matters will come under the decision of Captains in the next great war, and therefore the resources of our stations and the probabilities and possibilities of naval war should be studied as much in peace-time as possible, remembering that nowadays we cannot afford to allow the enemy the odds we were nearly always gracious enough to grant them in the past, and, more particularly so, as we are said to be, for some reason, about fifteen years behind a possible foe in the armament of most of our ships.

We have now eight squadrons under command of Flag Officers, and one (south-east coast of America) under a Post Captain, exclusive of the training squadron. Most of these have great Colonies and dependencies to protect in time of war; and though doubtless their Commanders have well studied their plan of action on a sudden outbreak of war, yet they have not the benefit of knowing what an adversary's plan of action might be; the stations are so large, and the force in most cases so inadequate for their complete protection, that an enemy's squadron might well concentrate to do harm at one place while the British were concentrating to defend another. If the British divided, the enemy could snap up the halves, one at a time, with superior force.

There is, of course, no remedy for this, except great increase in the strength of the squadrons, or the happy concentration at the right place—and this latter is successful strategy.

A Naval Kriegspiel.

In the game, for practice, it is suggested that the chief rule should be that the weaker in strength is always defeated. It is certainly proposed in one of the Service journals that the training squadron should act the part of an enemy on their next cruize, and attack the various stations, leaving the squadron on that station to make their best defence. That is a most excellent idea, and is, in actual practice, what the suggested game professes to be on paper; but squadrons cannot always be at that practice, and Officers can always be playing the game. Moreover, there are disadvantages in the training squadron's practice. The strength of that squadron is perfectly known to all their adversaries, and the expense—but the game would cost nothing excepting the wear and tear of charts, time and trouble of Officers, and the pens, ink, pencils, and scribbling paper used.

With regard to the time and trouble of Officers; at Greenwich Royal Naval College, for a day or so now and then, such a game might be a congenial and useful change from the algebra, kinetics, kinematics, &c., which the naval Officer so seldom sees in use elsewhere.

The game may be considered faulty in having many players; but is it altogether a disadvantage—as there would be many players in the real great game of war? In a game drawn up for instructive purposes it is necessary that there should be sufficient players to show the harm one or more may do to their side, apart from the player-in-chief, by want of judgment as to when to carry out literally the orders of their leader, and when to exercise the prerogative of every naval Captain on detached service—liberty of action. Moreover, in a game of instruction, it is no more wrong to have many players than it is to have the Lieutenants of the Fleet out for a morning's steam tactics in steam-pinnaces, a most useful and, under most circumstances, pleasant pastime. The chief umpire would always be an Officer of rank and great experience, as he is more or less an instructor as well as a judge, and would put in such contingencies in the course of the game as he might think likely to occur under such circumstances in real war. He should, of course, make no remark, and give no advice during the game, but point out the faults and instruct on what should have been done after he has given his final decision at its close; and perhaps he himself might learn a little in the course of a game.

The game should be played by two players or Commanders-in-Chief for their respective sides, also players as Commanders of each ship, of either side, who receive their orders from their Commander-in-Chief, but have the same liberty of action when away from their Commander-in-Chief as would be allowed on active service afloat. It should be watched over by one umpire-in-chief who would act as referee, and whose decision would be final, who also would declare the issue of the game, and it is to be hoped would be so good as to point out the faults, &c., after he has given his final judgment. There should be an umpire attached to either side to see that the moves, distances, &c., are made correctly; to receive protests from players, and decide them—unless the two differ, when the case would be referred to the umpire-in-chief,

whose decision would be final. Players and umpires having been arranged, the chief umpire would give to either player-in-chief a list of ships to be placed under his command, with their class, speed, coal-carrying capacity, daily consumption at various speeds, where they were at present stationed, and the ship on which his flag is supposed to be flying. Accompanying this he would acquaint him with the fact of his being at war with his adversary, and such slight details of his enemy's force and whereabouts, as would be likely to be known on a sudden outbreak of war. Either player-in-chief would then take such steps for the protection of the station which he is on, or for the attack of his enemy as he may deem fit, making his arrangements, giving his orders to the respective ship Commanders of his side as if he really were on the station in command of the fleet in question; and he should, before the moves actually commence, give in a sealed envelope to the chief umpire an outline plan of his intended operations, whether of offence or defence, so that the chief umpire may decide how far he has been successful at the close of the game; but he might at any time alter his intentions, when he would add a second to the first envelope, substituting an altered plan; the game to be played on ordinary Service charts, the ships represented by pin flags. As at military Kriegspiel, each side has a chart or charts concealed from each other, but the umpires have free access from one to the other, being bound on no account to reveal to one player what he has seen on another's chart. When, however, either umpire observes that vessels would approach to within 10 miles of each other, he is to call the other umpire's attention to the fact; and when their places on the chart are 10 miles apart, the umpires should place a pin-flag on the respective charts coloured according to friends or enemies. Ten miles is taken as the limit of sight, and 3 miles as the limit of effective battle; all moves being simultaneous, the ordinary move to be one of twenty-four hours, ending at noon, and measured according to the speed that the ship is declared by the player to be steaming. Thus if a ship leaves a port at 6 P.M. at a 10-knot speed, her move, according to course laid down by the player (correct magnetic) will be 180 miles on that course, and her next move for twenty-four hours would be 240 miles on that course, or any other the player may elect to alter to, then, or if he wishes to go so many more miles on the original course, and then alter, at the same or other speed, the courses and speeds should be laid down, and the ship pricked off at the next noon accordingly. The moves of opposing squadrons or ships within 10 miles of each other are reduced to one hour, and if they close to within 3 miles of each other, and remain so for one hour, and one is stronger than the other, either in number of ships or strength of ship, the weaker to be removed from the game; if of equal force, both to be removed from the game. A battle between equal naval forces in the future cannot but result in such damage to the victor as to put him *hors de combat* for a long time to come—longer than such a game as this would last; but players might for their own satisfaction, in a case of only two ships, either throw the dice to decide the winner, or, better still, try Captain Colomb's duel. In any case they would be

both out of this game. Of course, if it happens that the two main bodies meet in equal force, the game would be ended in a draw.

It is thus decided because then strategy ceases and tactics begin, and there is no game possible to be made which would be of any use for instructive purposes of actual engagement. The ships to play the game should be three classes of ironclads; the first, the line-of-battle ship with a maximum speed of 16 knots, not to last more than 24 hours, with intermediate speeds of 10, 12, and 14; the second, represented by the "Esmeralda" class, with a maximum speed of 18 for 24 hours, and 10, 12, 14, and 16; the third, small ironclads of 14 knots maximum for 24 hours, and 10 and 12; three classes of unarmoured ships, *i.e.*, first, with speeds of 10, 12, 14, and 16; second, with speeds of 10, 12, and 14; third, despatch vessels with 12, 14, 16, and 18; colliers with a maximum speed of 10 knots, and telegraph ships with a speed of 10, 12, and 14 knots. All the lesser speeds expend less and less coal, with reduction of speed proportionately, the despatch vessels alone to maintain their maximum speed for more than 24 hours, and those must not continue running at full speed for more than a week. After a week, they should require a day's lay by.

Each ship is to be given a total coal capacity with daily consumption at her different speeds. Any ship running short of coal in the open sea must remain stationary until taken in tow by a friend or foe, when speed of both is to be 8 knots, if the towing ship is as large or larger than the other; but 5 knots if smaller, except No. 2 class of unarmoured ship, which may at will sail at an average speed of 4 knots, if with coal on board under banked fires at half-an-hour's notice. Of course, Class 3 of unarmoured ships are not available for towing anything beyond one of their own class. Umpires to watch the expenditure of coal carefully.

The umpire-in-chief may, when giving his war declaration at the commencement of the game, mention any probability of reinforcement of the fleet likely to occur, and any probability of colliers or supply ships being *en route*, so that the Commander-in-Chief of that side may make arrangements for their disposition or further escort.

Ships requiring coal may be coaled by a collier being sent alongside either at sea or in harbour, when coal should be supposed to be put on board at the rate of 40 tons per hour, or they may be coaled by lighters alongside at real existing coaling stations, when the coal should be supposed to be coming in at 100 tons per hour. A ship or ships may be detached to cut or tap a telegraph cable (submarine); the ship in question should proceed to such a latitude and longitude as he deems best, and should then declare to drag, remaining stationary for one move 24 hours, and then if the umpire-in-chief considers he has chosen a right spot, he should throw a die, and if he throws over three, he may tap or cut the wire, if below he may remain another 24 hours and try again; and should he be successful and declare to tap, he may remain on that spot as long as he pleases, and any telegram sent by the adversary along that cable would be told to him as well as to the recipient at the end of the line.

If he declares to cut, the intelligence simply that that cable has by some means been rendered useless would be given to the senior Officer at each end, but no mention of how or where. The move of the opposing vessels within 10 miles of each other having been reduced to one hour, would cause a slight delay in the general course of the game, but difference of speed being never less than 2 knots, umpires can immediately see if the weaker can be succoured in time or reach neutral or friendly protected waters; if not, the ships can immediately be placed at the spot where the capture or destruction would take place—that is, supposing the weaker and slower vessel had been doing her best at 14 knots to get away from a ship which had command of 16 knots speed, it is plain that the pursuer comes within 3 miles of the chase in $3\frac{1}{2}$ hours, then allowing one hour according to previous rule, the capture may be supposed to take place $4\frac{1}{2}$ hours after the ships first sighted one another, supposing that the weaker turned to run immediately on sighting the enemy; so the chase having declared the course he intends to take, the umpire can see if he has a chance of meeting a friend or reaching a friendly port or neutral water before he has gone 63 miles, if not, the weaker can immediately be removed and the stronger placed on a spot 63 miles on that course whence the weaker sighted her, thus obviating the delay.

These being the rules of the game the rest is left to the umpire-in-chief, who would be guided by actual probabilities and possibilities not only in his decisions but in supplying as it were material for the game, such as scraps of information here and there of the enemy such as might in war time be gleaned from neutrals or from Consuls at neutral ports. In the event of a weaker squadron taking refuge in an unfortified harbour, it would be instructive if the plans and orders for the defence were given in writing to the umpire-in-chief, and the latter would then tell the senior Officer of the other squadron as much of these defences as a reconnaisance by an active enemy would be likely to discover, who should then declare if he would attack or blockade; if the former he should give in writing his plan of attack and orders to the umpire-in-chief, who would weigh the chances and give his decision as to what the result would most likely be; in view of this, let the torpedo equipment of the ships be fixed thus: Ironclads, 1st and 2nd classes, two 2nd class torpedo-boats, carrying two Whiteheads each; twelve observation mines, six E.C. or E.M. mines, in time of war kept ready for joining up with circuit complete; also stores for twelve extempore mines and four torpedo-guns or impulse carriages; ironclads, 3rd class, as above, except the torpedo-boats. Unarmoured ships, 1st class as ironclads 3rd class; unarmoured ships, 2nd class as 3rd class ironclads without the observation mines and with only stores for six extempore mines and two torpedo-guns or impulse carriages; 3rd class, no torpedoes. All ships to have the electric light, and all, except Class 3 unarmoured, defence nets. Torpedo-boats of the 1st class are not yet alluded to at all, though useful at times in the Mediterranean for despatch or blockading work, their ability to keep the sea is doubtful anywhere but there, and only

there at considerable risk, in the summer months. Of course, these boats will play their own considerable part in war, but it is submitted that it would rather be a defensive part, and would not enter into the strategy except in so far as they would add to the power of naval fortresses. They, however, or any other class of vessel, might be brought in by the umpire-in-chief.

Captain Harris's Essay.

In Captain Harris's Essay, in the Journal, No. CXXXIV, vol. xxx, he speaks of the attack by fifty torpedo-boats, on two or three armoured vessels. If that ever should occur, it would be due equally to the excellent strategy of the Officer in chief command of the boats, and the want of it on the part of the Officer in command of the ships. If the weather had allowed fifty torpedo-boats to get to the spot where these ships were, it would also have allowed the latter to have had some boats with him. If he did not possess any it would be simple foolhardiness in cruizing with three ships anywhere where it was possible for him to be attacked by such a force. If, however, he is merely on passage and he comes across this magnificent concentration he cannot be blamed, only pitied; but the same praise is due to the Officer in command of the boats in having brought his force at the right place to intercept a small squadron of the enemy on passage. Reading a little further in the Essay there is an extract from a paper published in the Journal, vol. xxviii, page 30, describing a proposed scheme of attack on a squadron by twenty torpedo-boats at night. (Extract.) "The Officer commanding has ascertained (how we need not inquire) the actual force and position of the hostile squadron." Why is the squadron in question supposed to remain 50 miles north of Ushant all night? Presuming a passing steamer brought the news, and to have arrived in Brest, which is most likely to be the port where the torpedo fleet are lying at seven o'clock, and supposing her to have steamed 15 knots, she must have passed the ironclad squadron at two in the afternoon; the torpedo fleet leaves at eight at a 10-knot speed, reaching the spot 50 miles north of Ushant at half-past three in the morning, as that spot is 76 miles from Brest harbour. Cherbourg is 140 miles from that spot, therefore that port is out of the question. The squadron then are supposed to cruize at one spot or within a few miles, all this time, probably knowing that at least some torpedo-boats are ready in some of the enemy's harbours near. This is not likely. Another view is that the Officer commanding the torpedo fleet receives the news by telegraph from, say, Barfleur, to the effect that torpedo-boat No. X, on watch off St. Catherine's, had seen the British squadron leave Spithead at 11 A.M., and steam down Channel. No. X immediately steaming full speed 20 knots carried the news to Barfleur, the nearest port, adding that the speed of the British fleet as near as could be judged was 10 knots; with this information the torpedo fleet commander sees that the squadron would be likely to pass the spot 50 miles north of Ushant about 4 A.M., so makes the able arrangement that the Essay

shows; but how problematical it all is! the 10 knots may have been $10\frac{1}{2}$, in which case he would be half an hour too late, or the squadron's course may be 10 miles to the northward, or it may be going into Plymouth. It would be a good game to start and see how often the torpedo fleet would pick up the ships before daylight. The case in point must occur in late autumn, winter, or early spring, otherwise it would be daylight at half-past three, and that being the case, the chops of the Channel would not be hospitable enough to allow the torpedo fleet very many opportunities of a night cruize to 50 miles north of Ushant.

However, the very fact of a considerable force of torpedo-boats being, so to speak, on the flank of a squadron even 70 miles off must enter into the calculation of our fleet commanders. It is said that torpedo-boats replace the fire-ships of the past. This may be true, but the increase of the power of these weapons over the fire-ships is proportionate to the increase of power of the guns, the increase of speed, and the increased means of communication of to-day over those of the past.

General Remarks.

All these improvements and all this increase of power in material tend to neutralize the advantage our seamen acquired and maintained over Continental seamen in the old wars. Continental, because the Americans were our equals, and in only too many cases took advantage of it by bringing superior material against us with fatal effect, not so much in concentration of superior numbers of ships, because they had not got them, as in meeting our cruizers with ships of greater structural strength and better armament. Lord Cochrane did not hesitate to run his sloop the "Speedy" alongside the Spanish frigate "Gamo," and succeeded in capturing her; but it would not be prudent in the 12-knot sloop of to-day unsupported, to get even in range of the guns of the 16-knot cruizer which now represents the old "Gamo."

Doubtless there will be many plucky engagements between British ships and superior forces in the next naval war, and if we are sometimes defeated, the defeat will be so glorious to us as to do more good than harm, morally speaking, to our Naval Service, and to the country; but practically of course it would do harm, as it would lose one or more good ships from the Service. No one who has read the story of the "Leander's" splendid resistance to and capture by the "Généreux" can say the British defeat lowered British prestige, but still must acknowledge that it lost the country a 50-gun ship. The British Navy in that year (1798) numbered 696 vessels, of which 182 were line-of-battle, 135 frigates classed from 56 to 32 guns; 49 small frigates, 28 to 20 guns, and the rest small craft; now our line-of-battle ships are about 25 in number, and our second class ironclads, which are considered to replace the 50-gun ships and large frigates, are about 20 in number. The loss, then, of a second-class ironclad nowadays, after however glorious a defence, would be a much more

serious thing practically for the country and the Service than the loss of the "Leander" was in 1798. Moreover, the chances of a successful defence now of, say, the "Shannon" or "Invincible" against the "Amiral Duperré" or "Peter the Great," are much less than the "Leander" had when she encountered the "Généreux."

The magnificent tactics displayed by our Admirals of the past, by which they neutralized the numerical superiority of their enemy, and attacked and overwhelmed the weathermost ships of their foe before the leeward ships could beat up to their assistance, are now no longer available. At the Battle of the Nile, Nelson engaged with his whole fleet but little more than half of the enemy, the rest being at anchor to leeward. Certainly this leeward division might have cut their cables, and worked up to take their share in the general engagement; certainly to destroy the "Culloden," and prevent the junction of the "Alexander" and "Swiftsure" with Admiral Nelson. However, nowadays a fleet situated as the French then were, would be under way in five minutes from sighting their enemy, and would meet it on most perfectly even terms, as far as tactics and mobility were concerned. All modern improvements have been more to the advantage of our possible enemies than to ourselves, and in view of which strategy, as far as we are concerned, is of more importance now than ever. Practically, naval success will be commanded by the biggest squadrons or, individually, by the strongest ships.

Conclusion.—The rules mentioned here for a War Game are but an outline, but all remaining rules can be supplied by the experience and skill of the chief umpire, who has but to be guided by the rules of war and international law, while all the resources for coal, munitions of war, &c., as they at present actually exist on the different stations, should bind the players on both sides. Thus it might be an incentive to Officers of all grades to study those resources, so that when war actually comes upon us, our Officers (not only Admirals and Captains) may know something about them, and not have to turn with a rush to such books as are now kept under lock and key in the Captain's cabin.

Captain P. H. COLOMB, R.N.: I think I ought to mention that this paper was not written for the purpose of being read at this Institution. It was written as an exercise by Lieutenant Snell, who sent it to me in a much larger shape. I suggested to him that the ideas in the paper were very good, very nicely and modestly put. that I thought his views were useful in many ways, and that it was desirable that they should be made public in some way. It was printed for private circulation, and then fell into the hands of the Council, who referred the matter to me to say whether it might be read, to which I agreed. I think it is put forward rather as an idea for discussion, than as a complete scheme in detail of a game.

Captain W. H. HENDERSON, R.N.: I think we should all be much obliged to Lieutenant Snell for drawing attention to this subject, and for bringing forward what is, so far as I know, the first practical attempt at a naval war game involving considerations of strategy, considerations to which every Officer commanding a vessel, from a torpedo-boat upwards, will have to give attention in war time, and upon which vital issues may be at stake. I do not propose now to discuss the game. One could not offer an opinion as to its utility unless one had had an opportunity of trying it; experience will soon suggest improvements and modifications, which may prove necessary, and will, I hope, develop its principles for practical application. At

the present moment naval Officers are feeling most seriously that there is great need for their attention to be drawn to questions of tactics and strategy. Officers present know that their time afloat is occupied in perfecting details of drill, but questions as to the conditions under which we should have to conduct the operations of a great naval war on which we may have any day to enter, and on which not only our naval supremacy but our maritime power may be at stake, are not seriously thought of. It is all very well to say that naval Officers will be equal to the emergency when the time comes, and be able to make up for the deficiencies caused by a neglect of a study of this subject in time of peace. I do not doubt for a moment we shall do our best, but this neglect will entail losses which should never have occurred, and will strain our resources to the utmost to overcome, the burthen of which will fall on the nation in sacrifices to a war tribute of blood and treasure unnecessarily heavy. Another thing to be noted is this. We cannot devote attention to this study of fighting conditions unless we are encouraged to do so by our superior authorities. It is, if I may say so, most difficult to get the attention of Officers and men to anything beyond the actual direction of their energies which for the time being hold sway. In fleets and squadrons if these energies are used up in rivalry in details of drills which hardly rise to the level of minor tactics in the sister Service, you cannot get them seriously to think of questions involving higher considerations of tactics and strategy, the significance of which we are just becoming alive to. The war scares of the last two years have impressed thoughtful Officers with our backwardness in this respect, and the absolute necessity there is for a consideration and study of the subject. While speaking in this sense it may not be out of place for me to mention that an immense sum is spent annually at the Royal Naval College for the education of our naval Officers, but naval tactics and strategy have no place in the curriculum, yet they are the most important subjects of naval science. We may have the best ships and the best drilled Officers and men, yet these advantages will be wilfully scattered to the winds if there is not in the Service generally an exact appreciation and knowledge of the conditions under which the naval operations of the day will have to be entered upon and carried out. To attain this, means intelligent study and careful provision for the exactions of war during times of peace. We are now able to define strictly the powers of every single arm, each ship and vessel has definite motive and manœuvring powers, definite coal-carrying capacity, can act at definite distances and over definite areas. Coal supply is the most important factor we have to deal with. Neither ships nor squadrons can operate without bases; bases mean lines of communication, both at the remote and immediate base, involving questions concerning their protection and defence. Blockade, and the tactics of a fleet or squadron in the presence of another fleet or squadron of superior or inferior force or speed, are equally capable of definition, and are of vital import to us. Together, these and many other questions raise the art of warfare at sea alongside of, and to the level of, the art of warfare on land. The Army has its text books of the science, and it is taught in all military training institutions, while in the Navy we have not yet reached the consideration of first principles. It is time surely to take a fresh departure in this matter; if so, the first step that suggests itself is the collection and collation by a competent Officer of the mass of material at hand into a form useful for the instruction of others. The knowledge so gained can be best diffused by a course of lectures to be given annually at the Royal Naval College, and practice, when necessary, can be carried out in the several squadrons when opportunities occur. This part of naval science is as worthy attention and teaching as any other part, and it is as true of this as of any other subject, that it cannot be acquired without systematic instruction. When the day comes for a general appreciation of this matter, I have no doubt Lieutenant Snell's ideas will bear fruit.

Captain Hon. T. S. BRAND, R.N.: I shall keep you a very few moments, but with all respect to Lieutenant Snell, and while feeling very much obliged to him for having written this paper, and thanking Captain Colomb for reading it, I must be allowed to say that in coming to hear a paper on naval strategy I am disappointed. I take it that naval strategy means naval tactics over the whole world, but Lieutenant Snell's war game is quite distinct from naval strategy, in so far as we have in this paper an idea of what two squadrons are to do when within a

certain measurable distance of one another, and they are to fight on their stations. I look upon it that naval strategy is not the action of one vessel against another, but it is the manœuvring which the Admiralty themselves will carry out by means of different squadrons over the whole world; and as such the first and most important point is that there is to be a distinct understanding where coal is to be obtained, and how that coal is to be protected. I rather think that Lieutenant Snell is a little sanguine on two points: first of all the speed of the ships, and secondly the amount of coal he can take in. I do not profess to be of great experience in the Navy, but I do know that 40 tons an hour at sea and 100 tons an hour in harbour is a very large amount of coal to take in. I will only offer these few remarks, confining myself, as far as I can, to the actual point before the meeting, which is strategy, and I really think what has fallen from Captain Henderson would be very valuable, if we could have a little instruction either in naval tactics or naval strategy, and not have all the information which, I suppose, is to be had somewhere, locked up, as Captain Colomb says, in the Captain's cabin.

Lieutenant TUPPER: I trust that my earnest desire to support Lieutenant Snell in bringing this vital subject before the Service will be accepted as an excuse for my presuming to offer any remark in the presence of so many distinguished Officers. In the first place, I do not think Lieutenant Snell laid enough stress upon the connection between coal capacity and naval strategy. I think the two are absolutely inseparable. You cannot put your ships anywhere without coal. If we look back to the days of Nelson, we see that that which gave us the great advantage over our enemies was the fact of our having "kept the sea." Our fleets were always at sea, and kept our enemies blocked up in their ports, which caused their seamanship to become rusty, and that by the wonderful resources engendered in constantly repairing their *motive power*, viz., rigging, spars, and sails, under the greatest difficulties and with inadequate means, they were able, when the enemy came out of port to meet them; they had a much greater command of seamanship than their enemies possessed, and thus were better at tactics and command of motive power. I think, therefore, that now that masts and sails in our fleets are absolutely obsolete as a *motive power*, we must turn our attention to the burning question—supply of coal. We *must* have a constant supply of fuel for our ships somehow or other, and I think in time of war the coal of a man-of-war should never be allowed to be reduced below one-third the total storage, so that if you meet the enemy, you may have coal enough to fight with at full speed. The question arises, how is this to be done? I think squadrons should be exercised, if possible, at keeping the sea for two or three months. It would be very unpalatable to many of us to be kept at sea so long; we naturally do not like it, but it would be a useful exercise to "keep the sea" off a port somewhere, to see how we could manage to keep the ships in all respects ready for battle at a moment's notice. Of course this would entail coaling ships at sea. I think in war time some means will have to be devised for performing this difficult operation, but it is a question which I am afraid has always been neglected. Several Officers have sent in plans for coaling ships at sea, but, so far as I know, ships have hardly ever been coaled at sea, and these plans have never been even tried practically. I know in one case some ships in the Channel Fleet found it necessary to coal at sea. They knocked their boats to pieces, and got in only about 10 tons an hour, if as much. It seems to me that if a Committee, composing three naval Officers and two naval Architects, were associated together to consider this question, and to form some designs for suitable barges, buckets, and bags, and general fittings for coaling ships at sea it would be very beneficial to the Service. Then as regards colliers; my idea of a collier would not be a 10-knot collier, as Lieutenant Snell suggests, but colliers of the swiftest speed attainable, say, the big ocean steamers full up with coals armed only with machine-guns; and to utilize them not only as colliers but also as look-out ships—the eyes of the fleet. In the old days we had Nelson always complaining of his want of frigates, and consequent want of intelligence, and saying that the word "frigate" would be found written on his heart when he was dead. Now, if we had one of these large ocean steamers, very swift, full of coal, told off to each pair of ships of the fleet; with a fleet of ten ships you would have four of these steamers on the look-out, and one completing its pair of ships with coals. I think that would be a very beneficial arrangement.

I now go on to the war game itself. Captain Henderson has rather taken the wind out of my sails with regard to that, for I was going to remark that until their Lordships consider that such a game will be greatly beneficial to the Service, and officially recognize the game and order it to be played, say, once a week in all the home ports, on board the flag-ship, and the Commanders-in-Chief on foreign stations order the Officers to assemble to play the game when exigencies of service permit, there is no chance of its being carried out. The fact is that it is really impossible, the Officers of our war ships are constantly at work all day, and when they have a watch below they have much writing and reading work to do to keep pace with the times, so that I do not think you will get any Officers to attend a naval war game, at any rate as a recreation, on board sea-going ships. As to having it at the Royal Naval College, I do not think that would be a suitable place to introduce it. The Officers of the Naval College, particularly the junior Officers, are all undergoing, as I have done myself—I must admit it—a certain amount of a system of cram. They have often to attend four lectures a day, and then work them up at night till 1 A.M., to get ready for more lectures the next day. Now the naval war game is a study you could not possibly enter on without a very clear head, indeed you ought to have given it some thought, in my opinion, a day, or even a week or two before, and I think if a man who was studying hard at the Naval College attempted to undertake the naval war game as well, he would probably find himself resolving his ships into factors, and "taking moments" round a point of land, and so forth, which would not be very satisfactory. I think something might be done through the means of the Navy Club, in Grafton Street, London; perhaps we could get Officers on half-pay, or leave, to attend there once a fortnight to study this subject in the shape of Captain Colomb's game, and also Lieutenant Snell's suggestions, for doubtless there are many Admirals, Captains, and Commanders always in the vicinity who would be glad to meet together to discuss this important subject, and who would also be glad to give the benefit of their experiences to the more junior Officers, and mutually give all their information respecting those ports and the coast line of that part of the world in which the game was being played upon the charts; if such an idea were carried out, I cannot but think it would be greatly beneficial to individual professional knowledge, and to the public service.

Admiral WELLS: I think we may feel that the Admiralty have at last woke up to the fact that it is necessary to organize some system on the breaking out of war. We hear a good deal about the new Intelligence Department, and from the little that leaks out I think one feels satisfied that several of the things which are advanced in the paper with respect to want of premeditation in preparing the various ships, places of meeting, and information for the Commander-in-Chief, which would be required in the case of war breaking out suddenly, have been dealt with, and that in course of time we shall have something put before us. A case occurred some time ago on the China Station, which I think startled a great many naval men who were aware of it. The Russian Squadron being in one of the northern ports, was at anchor with the British Squadron. Suddenly one morning they began to prepare for sea; at eight o'clock they disappeared. The Admiral at breakfast made the remark that he thought it was rather uncivil their going away without offering to take letters. In about three days' time up came a steamer from the southwards to announce that war was possible. Away went the English Squadron, and found the Russian ships stationed at the various junctions on our many trade crossings, and at our principal ports; amongst others they found a ship at Hong Kong. The Captain of this vessel was met by one of our ships at the Cape of Good Hope on the way home, and he there said, talking the matter over after dinner, that he regretted very much that war had not broken out at that time; that every one of their ships were placed in their proper places to do as much harm as they could before the English ships found it out, and that he would have been bound to obtain some very large sum of money from Hong Kong, either in cash or its equivalent in opium. This showed that arrangements were ready there and then to destroy our commerce. I consider that as a very startling thing, and it certainly woke up a good many people to the fact that not only the Germans on shore, but the Russians afloat, were perfectly aware of the necessity, and had also arranged to meet it when occasion necessitated. That part of the strategy is one

that we are likely to have met, I hope, by the present Intelligence Department. Directly a war breaks out there must be something arranged; there must be some information which the Commander-in-Chief on a foreign station must open, and find everything cut and dried; he will then have rapidly to consider the circumstances, and to make any alterations that are necessary upon his own responsibility, but if we could once get that, it would be a very great thing to start with. Captain Brand's proposition, that the whole arrangement should be made from the Admiralty, and also that you cannot have a war game unless it is fought all over the world, opens up a very large question. As it is even now in the naval point of view of Lieutenant Snell's paper, it is a very large question to fight it on the station, but to fight it from the Admiralty all over the world would be almost an impossibility. The only part you could do is in this way. You would say that war with a certain country where our interests are very great would require an increased squadron, and the Admiralty might go so far as to increase that squadron, but still the movements of the ships and the movements of the enemy must be left entirely to that portion of the station wherever it may be, and the battle cannot be fought from the Admiralty. I think, Sir, that these are the only observations that I am prepared to offer at the present moment.

Captain CURTIS: It seems to me that Captain Brand and Admiral Wells have both hit naval strategy on the right head. We know that when war is declared Germany, for instance, has arranged what shall be done with her troops, and I think, with Admiral Wells, that each Admiral on a station ought to know, directly he hears of war, how to dispose of his squadrons, and at what points to put them. It is not always the best policy to seek an immediate action and try to destroy the enemy; the great point is to protect our commerce, because, as they say, if one of our second-class iron ships be sunk, the loss is equivalent to that of ten or fifteen frigates of the olden time. Hereafter we shall have an opportunity of discussing what Lieutenant Snell has said about sails and masts. Our ships have military masts,[1] and perhaps some of our young Officers will tell us whether in a very heavy gale of wind the sea makes a clean wash over ships or not. In olden times we used to give a ship a list to leeward, so that the sea could not wash over them, but it appears to me, from what we read nowadays, that the sea makes a clean sweep over them. With respect to this war game, I may say that when I was at Malta in 1843 and 1844 we used to practise every Friday; all the boats in the squadron went outside the harbour to practise naval tactics. I think when the fleet is at sea that under ordinary circumstances each of the boats of a ship might take part in naval tactics, as, indeed, I suppose they do. That would be the way to carry out any of our plans in reality, either at Spithead or wherever the squadron has an opportunity. I think this coal business will be very soon settled, inasmuch as coal will soon be superseded by oil as fuel.

NOTE.—In moderate weather there should be no difficulty in keeping a vessel at a respectful distance and coaling from her; tow by a span and have distance lines; regulate the helm as required. To give confidence it should be practised regularly. Large naval 20-knot coal depôt ships should always accompany the fleet, a vessel of 10,000 tons. The vessel containing Cleopatra's needle always sheered off the vessel towing her.

Captain P. H. COLOMB: I think we must recollect that Lieutenant Snell's paper is, as he says, suggestive more than anything else. I presume there is not one of the rules from beginning to end that he would be prepared to stick to if after practice and examination it was found better to alter it. It is simply that he has put before us a method by which our attention may be drawn to matters necessary to be understood when war comes. I think that is the aim and object of the paper. I do not think Captain Brand quite understood the scope of the paper when he said that it was not large enough. I see nothing to prevent the players, if they choose, supposing one to be in Paris and the other in London, or, shall we say, one at Rome and another in Paris, or any arrangement you choose to make of that kind,

[1] Why not term them fighting masts or fortified masts? The term military usually applies to soldiers.

and so play it over the whole world. There is nothing I know of in the paper to prevent you doing it, but at the same time I think, as has been said by one of the speakers, that playing it over the whole world would be a little too extensive. It has also been said that there would be a great deal of strategy necessary on each naval station. When I was on the China Station my experience was not so complete as Admiral Wells's, but it was very much the same. We found ourselves with the Russian war scare on hand, with the south-west monsoon blowing, and with the knowledge that the Russian ships could get down to Singapore to cut our trade off, and that we could not under the circumstances. Well, of course, the playing of a game such as this with ships of limited coal capacity and limited space would show you continually where our weak places are. Admiral Wells spoke of the trading junctions. There is no question whatever that our adversaries would be bound to go for our trading junctions; and yet there are very few of us who, off hand, could put our fingers on the spots where these trading junctions are. But you must recollect our adversaries have got it all cut and dried; they know where to go. Well now, this game I take it would compel the players to think where our trading junctions are. Supposing we put ourselves in the position of the English Fleet, and the other player in the position of an enemy's fleet; that the other player would be bound to find out our weak places, and would probably show the first player the weak points which he had discovered. I take it, then, that you will get every value out of a game of this kind, supposing it to be launched and played. In the way we manage things in England, especially in the Navy, it is difficult to get anything of this kind done, because, as has been very justly said, Officers will not willingly withdraw any attention from the curriculum prescribed by Government to anything outside that curriculum, and I think myself it is a misfortune that during all these years some attempt has not been made to include the science of fighting in that curriculum. You see we learn how to use artillery, to manœuvre ships and fleets; we learn torpedo work, but we do not learn attack and defence in any way. We know nothing at present of what the weak part of a fleet is. In the little attempt that I made myself in the matter of the duel, it was not, I must say, satisfactory for me to find that the Government of every nation except our own was working it, and ordering it to be used as a means of instruction. I did not care myself to have produced that which the Governments of other nations who might possibly be our adversaries were employing, while we ourselves were making very little use of it. I do not mean to say that we are not right and foreign nations are not wrong, because it might not have been worth it; but still there is that tendency amongst us that we do not in our Navy learn to prepare ourselves for war; we learn a great deal, but we do not learn that one thing; we do not think steadily of what we are going to do in war, what the dangers of it are, and on what our success will depend. I agree with Captain Brand pretty strongly about the rate of coal supply which is given by the Lecturer. I do not know how you are to get in 40 tons an hour at sea, or even 10 tons, or 5 tons, or 3 tons. I know of no way that is really arranged, but there was a plan mentioned in a paper before the Institution many years ago, and a very ingenious one. It was this: that the collier took the man-of-war in tow, or *vice versâ*; two hawsers ran from the masthead of the collier to the bows of the man-of-war, and the empty buckets went on one line and the full buckets on the others. Something of the sort, I take it, might very likely be found practicable. I think Lieutenant Tupper in laying a stress on the necessity for coal capacity hit the nail on the head. I look upon it that coal capacity is everything. I do not care so much for excessive speed on the measured mile, or for half-a-dozen hours, though it may be useful sometimes, but I do lay the greatest possible stress upon an enormous and overwhelming coal supply. I used to look upon the "Hecla," although she is not very fast, with great satisfaction when I learnt that she could take, I think it was something like 26,000 miles in her bunkers at 8 knots; I began to think that practically a ship of that class would coal at the beginning of a war, and that at the speed at which wars are got over nowadays, she would not want to coal again. I should like to see the whole of our fleet in the same condition. Captain Curtis struck a belief of mine also when he spoke of petroleum as likely to come in and solve the question of coaling at sea. I believe petroleum is coming in faster than we are quite aware of. I do not like it,

because I do not believe we can produce petroleum at the small cost at which it can be got by other nations; but I believe that it is coming forward, and that coal will disappear. I think also the idea of look-out colliers is a very good one. I was thinking, whilst walking down here, that the best look-out ships you have really got now are the very large fast merchant steamers, because they can face any sea, which the smaller class of ships cannot; but if you combine the fast ships and the collier together, it seems to me that you utilize the mass of the ship which otherwise would be idle. I also agree that the Greenwich College is not the place in which to play the naval war game. It is a matter of instruction, but it is desultory instruction, and there should be a certain amount of amusement about it, and, besides, whatever the nature of the game, there must be a good deal of it in the clouds. Now, I do not think that at the Naval College anything should be in the clouds. Nothing should be ventilated there in the form of instruction of which the basis is not pretty sound. You ought not to go into speculation, you ought not to go into matters which are capable of adverse discussion; what is done and said at Greenwich College ought to be done and said by authority. I should like to add, that I think Lieutenant Snell deserves great credit for the way in which he has put this paper together, and I should say also that if there is any responsibility taken by an Officer on full pay reading a paper here, I desire to take that off Lieutenant Snell's shoulders and on to my own, because it certainly is not his doing. It was my doing that it has been read publicly here. I think the paper is of such a character that it is sure to do good when it goes into the Journal, and is read by naval Officers generally.

Captain HENDERSON: I did not mean, and I wish to correct any impression I may have made as to the Royal Naval College being a proper place for exercising this war game. I agree with Captain Colomb and Lieutenant Tupper in this respect. What I said was that the Royal Naval College is the proper place to start the teaching of this branch of naval science, which should, as Captain Colomb says, be laid down by authority. I do not agree with Captain Brand, for I think if you were to try to play this game at the Admiralty with the whole world for your field of operations you would never get to the end of it. Very much will have to be left to Commanders-in-Chief, and much will devolve on individual Captains, Commanders, and Officers commanding even torpedo-boats.

The CHAIRMAN: I will at once say I am quite certain a paper like this can in no degree compromise any Officer who is serving in the Navy, for it is an excellent paper upon a practical subject containing no controversial matter; and I should think everybody in the Admiralty, as well as every one here present, would feel thankful to Lieutenant Snell for producing a paper such as this. I do not propose to take up your time: the subject has been as well threshed out as it is capable of being in its present state. I think Captain Henderson's observations upon the necessity for naval Officers being encouraged to acquaint themselves with tactics and strategy, which they will be expected to carry out in war, were very well placed; for we must all have felt the absence of encouragement to naval Officers to study and discuss tactics and strategy. Admiral Wells has pointed out in a very practical manner what might have happened to us at the outbreak of a war; but, as he says, there is an Intelligence Department now in the Admiralty, the scope of which is being enlarged, so that I hope such shortcomings as he mentioned will not happen again. That being so, with this enlarged Intelligence Department in the Admiralty and the encouragement to naval Officers to study their profession by means such as are recommended in this paper, I hope we should be in a fair position, both as regards the general plan on entering upon a war, which of course would be in the hands of the Government, and also as regards the handling of fleets and ships on the different stations. Considering the very great advantage that we know the Army is deriving from the Kriegspiel game, which they have had for some time, we ought to feel very thankful to Lieutenant Snell for giving us a paper which contains the foundation for a similar game by which the naval Service might be equally benefited. I am sure you will agree with me in asking Captain Colomb to convey our best thanks to Lieutenant Snell for his paper, and also in offering our thanks to Captain Colomb himself for kindly undertaking to bring it before us.

Friday, February 11, 1887.

ADMIRAL SIR EDWARD G. FANSHAWE, K.C.B., Chairman of the Council, in the Chair.

COAST DEFENCE BY GUNBOATS.

By Admiral SIR GEORGE ELLIOT, K.C.B.

THE effective defence which has been made by gunboats against ships in former wars is such a notable fact, and is so well known to naval Officers who have looked into the pages of James's "Naval History," that I make no reference to the special occasions when even ships of the line have been driven off from intended depredations on an enemy's coast by these diminutive antagonists.

The question which I submit for discussion on the present occasion is whether modern inventions which have led to so many changes in the art of naval warfare have in any degree affected the essential value of this class of vessel for coast defence, either by the introduction of steam, or armour-plating, or submarine mining, or rifle guns of greatly increased calibre, or quick-firing or machine-guns, or by the substitution of vessels of the "Glatton" type, or by torpedo-boats of various types and dimensions, or by a combination of all or any of these appliances for purposes of in-shore defensive operations.

So far as I can judge, I am unable to perceive that the modern gunboat has been supplanted by any of these novel features, or has lost any of its effective power of warding off attacks by bombardment at long ranges, whether by single ships or small squadrons, and, in fact, that whatever advantages have been obtained on the one side are equally applicable to the other with respect to those innovations. Indeed, so far as I can foresee what will be the result of future encounters between gunboats and ships, it would appear that, owing to the reduced number of guns which modern ships now carry, and the long ranges at which the stoutest ships are now penetrable by guns which can be mounted in gunboats, and with the introduction of the latest invention in shell projectiles, the gunboat of the future has rather gained than lost in its offensive and defensive properties.

The ironclad is doubtless less vulnerable than the old liner, but so also will be the shield-protected gunboat fighting end-on, and the superiority of rifle guns will apply equally to both cases, and the smaller object will still retain its distinct advantage.

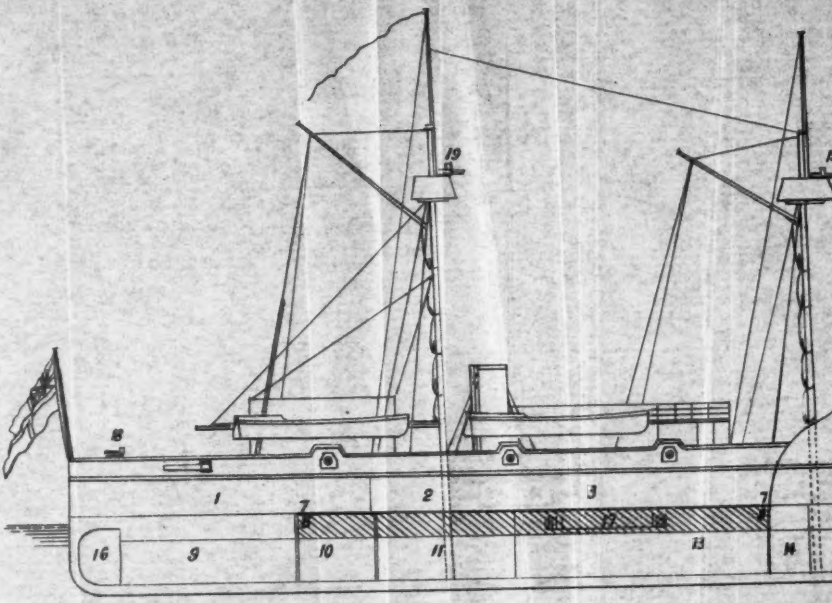
As regards the services which can be rendered by shore batteries and submarine mines, and by torpedo-boats, I desire to be clearly understood as in no way disparaging the essential value of these elements of defence, which fulfil their respective requirements quite

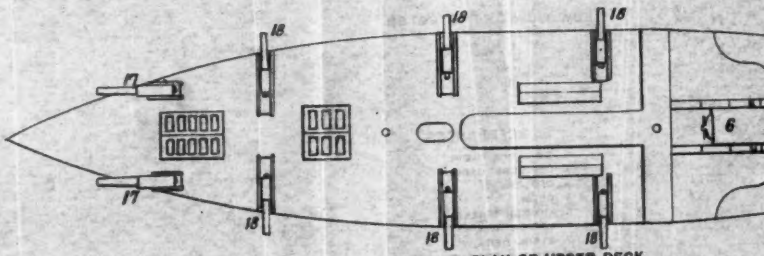
apart from the gunboat question which I have raised, but I do venture to say that the combined action of the three former provisions will prove inoperative in the absence of any assistance from gunboats to prevent hostile vessels from bombarding many of our seaport towns with impunity from a distance of, say, 4 or 5 miles. On this point I fully expect to be challenged by torpedoists, but I venture to assert, that whilst an attack by torpedo-boats could be repulsed by gun-fire from ships under weigh in the offing, gunboats would successfully harass an enemy into keeping at a respectful distance from the shore, and if I am correct in this opinion, it follows that defence by torpedo-boats alone cannot be relied upon, except under certain favourable local configurations of sea and land, to prevent the bombardment of open places.

I accepted the invitation I received to prepare a paper on this subject, because it has appeared to me that the craze for torpedo-boats as the sole precaution against the depredations of an enemy's cruizers who may have evaded the vigilance of look-out ships was taking an extreme view of their capabilities, and that a combination of these two classes of flotilla was essential for coast defence; and seeing that whilst other nations are carefully providing for this double requirement, our programme for increasing the Navy has not included the building of a single gunboat of the requisite type, I felt it desirable that the opinions of professional Officers should be manifested by the useful means afforded for discussion at this Institution.

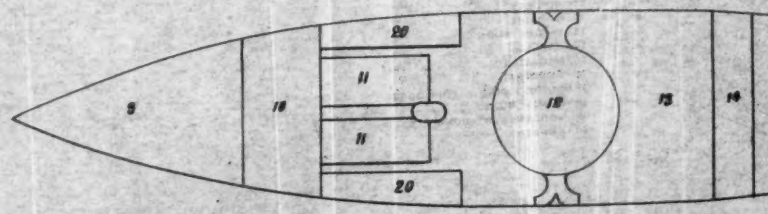
The question of profitable expenditure of money is, however, closely connected with the decision which will be arrived at on the choice of armaments, and it becomes a matter of the highest economic importance, in relation to the subject before us, to decide whether the most efficient protection will be afforded by an equal expenditure on *Gunboats* or in some other direction. For instance, it has been upheld that the same outlay on an additional number of war-ships would afford greater security to our shores, and at the same time increase the strength of our sea-going fleet in case of need, and this opinion presents itself with a certain amount of force at first sight; but I maintain that it is quite unacceptable from the point of view of reliable coast protection, seeing that the same amount of money which would provide an adequate force of gunboats would not produce a sufficient number of look-out ships to prevent sudden encroachments on our extensive line of coast by swift vessels bent upon the destruction of property, and the wear and tear of vessels keeping the sea in British waters would be very great, and they would have frequently to come into harbour for supplies of fuel and for repairs, whilst a local flotilla force would always be on the spot and in a state of readiness. There is no higher authority than Sir Andrew Clarke on the subject of Coast Defence, and he has recommended the employment of sea-going guard-boats, very swift, but completely unprotected by armour and lightly armed, and he places great confidence on the accuracy of locomotive controllable torpedoes, even against vessels under way and from a distance of about 2,000 yards. The

PROTECTED GUN BOAT, DESIGNED BY ADMIRA



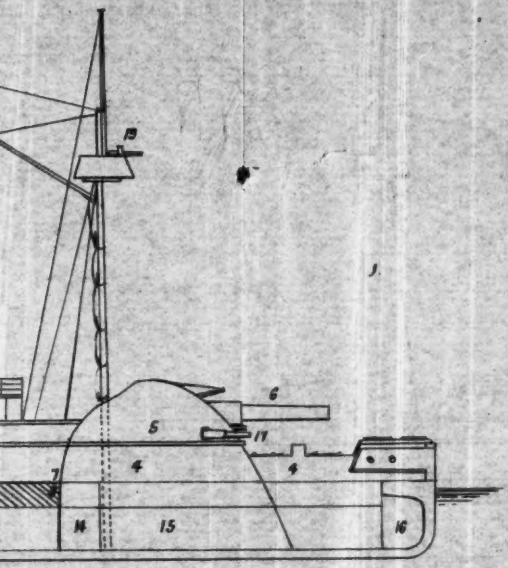


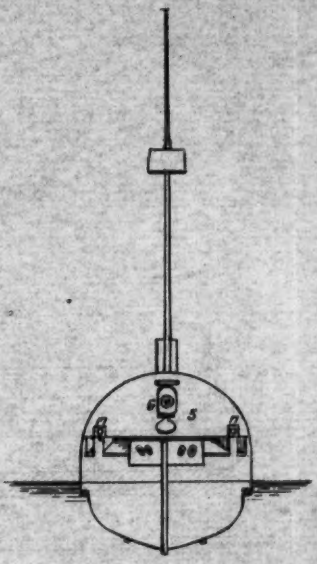
PLAN OF UPPER DECK.



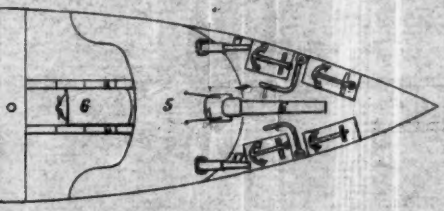
PLAN BELOW THE WATER LINE.

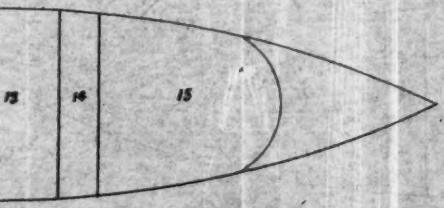
D BY ADMIRAL SIR GEORGE ELLIOT, K.C.B.





BOW VIEW OF PROTECTED GUN SOAT.





LINE.

REFERENCES.

1. CAPTAIN'S CABIN.
2. OFFICERS' CABIN.
3. STOKERS.
4. CREW.
5. ARMOUR SHIELD.
6. 43-TON GUN.
7. STEEL DECK, 1"
8. ARMOUR BELT, 9" STEEL.
9. AFTER HOLD.
10. SHELL ROOM.
11. BOILERS.
12. TURBINE.
13. ENGINE ROOM.
14. CABLES.
15. MAGAZINE.
16. RUDDERS.
17. QUICK-FIRING 6-POUNDERS.
18. 9-INCH GUNS.
19. NORDENFELDT GUNS.
20. BUNKERS.

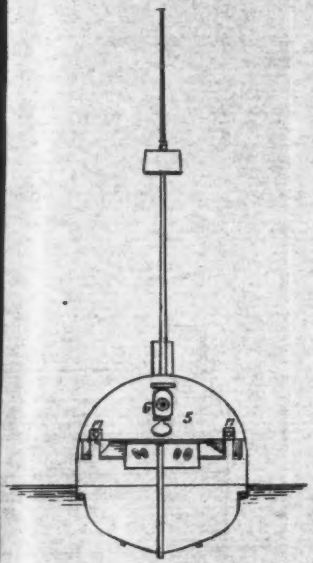
Scale of feet.

Harrison & Sons Lith. St Ma

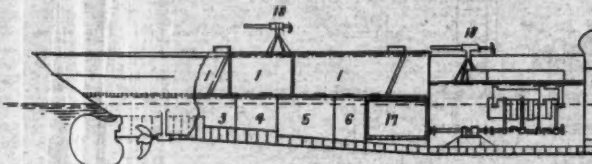
GUN BOAT PROPOSED BY LT.-GENER

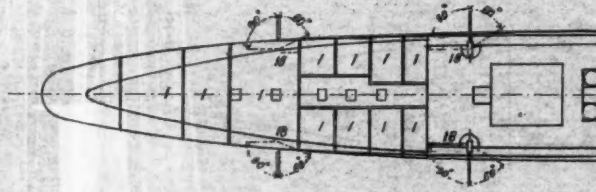
SPE

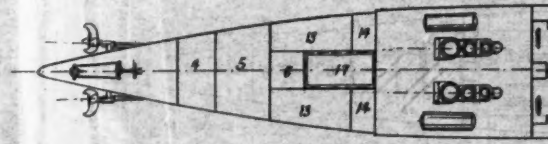
DESIGNED BY



BOW VIEW OF PROTECTED GUN BOAT.







REFERENCES.

1. CAPTAIN'S CABIN.
2. OFFICERS' CABIN.
3. STOKERS.
4. CREW.
5. ARMOUR SHIELD.
6. 45-TON GUN.
7. STEEL DECK, 1"
8. ARMOUR BELT, 9" STEEL.
9. AFTER HOLD.
10. SHELL ROOM.
11. BOILERS.
12. TURBINE.
13. ENGINE ROOM.
14. CABLES.
15. MAGAZINE.
16. RUDDERS.
17. QUICK-FIRING 6-POUNDERS.
18. 9-INCH GUNS.
19. NORDENFELDT GUNS.
20. BUNKERS.

1. OFFICERS.
2. CREW.
3. STEERING COMPARTM
4. SPIRIT ROOM.
5. WARD ROOM STORES.
6. DYNAMO ROOM.

Scale of feet.

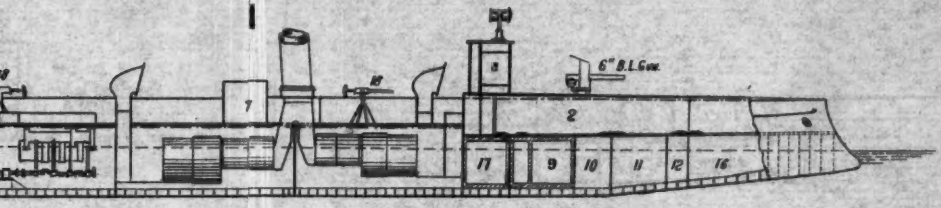
0 10 20 30 40 50 60 70 80 90 100 FT

Harrison & Sons, Lith. St. Martins Lane W.C.

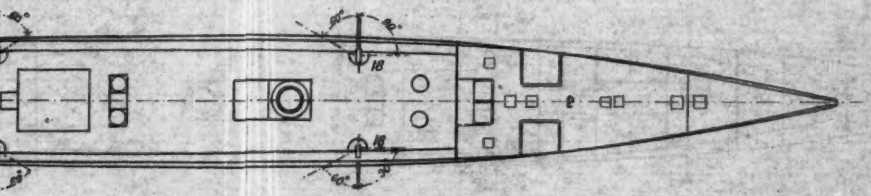
LT.-GENERAL SIR ANDREW CLARKE, G.C.M.G., &c., &c., R.E. (RETIRED.)

SPEED 22 KNOTS. I.H.P. 3200.

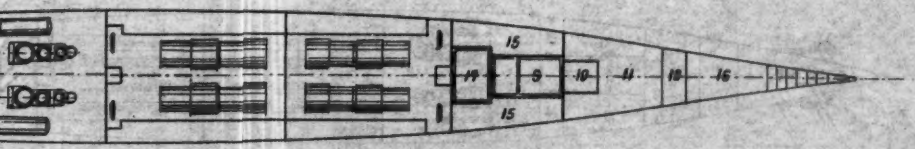
ESIGNED BY PALMER'S COMPANY, JARROW.



ELEVATION.



DECK PLAN.



HOLD PLAN.

REFERENCES.

FICERS.
EW.
EERING COMPARTMENT.
RIT ROOM.
RD ROOM STORES.
HANO ROOM.

7. GALLEY.
8. CONNING TOWER.
9. MAGAZINE.
10. SHELL ROOM.
11. BREAD ROOM.
12. CABLES.
13. WATER TANKS.
14. ENGINE STORES.
15. PROVISIONS.
16. WARRANT STORES.
17. QUICK FIRING AND SMALL ARM MAGAZINE.
18. 6-PR. QUICK FIRING.

model of this vessel is before the meeting (see Plate II). I feel very loth to set my opinion against his, but I know that he wishes to have his suggestion fully considered by naval Officers in all its bearings; and although two of his unprotected vessels could be built for the same money as one of the local gunboats I propose for harbour defence, yet I question their equal capacity for the purpose I have named, that of the prevention of bombardment at long ranges, because I consider that these vulnerable vessels will be destroyed in detail by gun fire, as a ship at sea would naturally turn away from approaching torpedo-boats, and put on speed if necessary in order to keep them under fire as long as possible; and when ships are moving in the same direction the striking range of the torpedo is almost reduced to close quarters. I think a little "war-game" on this tactical question would throw light on the subject. However, since these remarks were printed I am glad to find that there is no difference between the opinions I have expressed and the views entertained by Sir Andrew Clarke with regard to the special qualifications of his design for a guard-boat and the gunboat I have proposed. He now writes as follows on this subject: "My vessel in no way interferes in its object with your gunboat. Mine is a true *guard-boat*, not a gunboat in your sense. Mine would act as a *vidette* always on the move, in foul weather as well as in fair, would be the *pilot fish* to your *big shark*." He goes on to say: "I do not believe in the present type of torpedo-boats, they have speed in fair weather, and that is their only good quality. I claim equal speed if not better for my vessel, and in all weather; strong seaworthy boats with great comfort for their ship's company, and armed with a very formidable destructive weapon." I consider Sir Andrew Clarke's design for sea-going lightly armed guard-boats admirably suited to take the place of the gun-vessels we are building for foreign service, if alone on account of their great speed—22 knots—and that they would on the outbreak of war be able to take care of themselves and would become valuable auxiliaries to our foreign squadrons, but in my opinion no such unprotected torpedo-vessels could drive off an armour-protected ship manœuvring in the offing, subject to the rapidity of fire from numerous guns, and of course at night an attacking ship would put to sea, or whether by night or day protect herself against torpedoes by her crinoline whilst bombarding.

There is no doubt that the trade routes of home-coming vessels would have to be protected, but ships so employed would cruize on specified lines of approach to our shores, and not in close vicinity to our coasts; I therefore maintain that local defences constitute the only reliable and the most economic mode of protecting the vast property which lies on our shores, the absence of which would always be a source of great temptation to the cupidity of our enemies —and this rule equally applies to all our Colonial possessions.

The French Minister of Marine, in his category for strengthening the Navy of France, lately submitted a demand for fifty gunboats and for three armoured coast defence vessels, in addition to those already built, which displays the evident purpose of affording

sufficient protection by local defences to their coasts, so as to render their fleets available for foreign excursions. Surely if France and other nations can afford to build special classes of vessels to protect their shores in order to give freedom to their sea-going fleets, our Imperial position imposes upon us a still greater necessity for this measure of precaution, as the command of the seas and the protection of our Colonies and trade routes will not be secured by locking up our fleets in the British Channel. One important feature of the case as between coasting cruizers and local gunboats is, that whilst the former require to be manned and officered from the Royal Naval Reserves, the personnel of the latter would be entirely composed of volunteers; but there is another weighty reason why it is unwise to place reliance on any other than local forces as a barrier against isolated attacks on our coasts, which is that all cruizing ships would of a certainty by political economists be reckoned up numerically with our sea-going fleet in comparing the strength of the navies of Europe, and thus have a tendency to overestimate the strength of our first line of defence, which tendency, unfortunately the bogus spirit of the age, is too apparent in certain quarters.

Future wars will be sudden and of short duration, and history teaches us that the command of the sea has belonged to the victor in one great fleet action, and also shows that England was saved from invasion, amongst other occasions, once by the destruction of the Spanish Armada, and again by the victory of Trafalgar; but these great successes have become more uncertain in the future, and defeat will be more crushing than heretofore and recovery more hopeless, notwithstanding our enormous manufacturing resources.

What security do we find then in our present impoverished first line of defence? What has become of our great numerical superiority? Lord Brassey's comprehensive and impartial statistical compendium of the strength of the navies of Europe discloses a state of false security which only a fatalist can contemplate with unconcern. Our next fight for existence will depend mainly on the number of first-class armour-clads which can be brought into line in the first great fleet encounter, and Lord Brassey's book shows, if we reckon only ships built and completing, protected by not less than 15 inches of armour, and armed with guns of not less than 43 tons B.L., an exact equality between the navies of France and England, but with a superiority on the side of France in weight of guns and thickness of armour. Moreover, with our present inadequate peace establishment of men, our ships on foreign stations would be found considerably undermanned, and with a much larger number of non-combatants as compared with ships of the French Navy.

What then can be said about our "being prepared in every respect to contend against any probable combination against us"? These are statesmanlike words which our highest authorities are wont to use when addressing public assemblies, and which are cheered to the echo, and yet where is the realization of these patriotic expectations? This can readily be ascertained by referring to the demand for

reduced estimates, which appears about to be once more the order of the day.

I have digressed apparently from the subject-matter of my text, but it becomes necessary to my advocacy of adequate local defence by gunboats that the prospect of security to our coasts afforded by a reliance on the watch and guard of our first line of defence should be carefully weighed and considered. It may be said that England possesses a larger number of obsolete vessels than France, which will count for something; but against such an argument can be placed on record the far greater demand imposed on our sea-going fleet for the protection of our Colonial Empire and trade routes; and whilst I quite uphold the doctrine that it is not within the province of naval Officers to become exponents of the science of political economy, yet I maintain that it is equally not their duty to water their decisions on matters of strategical importance from economic motives, with the one exception that they should study the question so far that public money may not be squandered on ill-advised armaments, which opens the widest door to wasteful expenditure.

I have so far treated this gunboat feature only as a defensive force, but it can be shown to possess important relations to offensive operations, which would be recognized if in the event of a war with France a flotilla force of swift gunboats and torpedo-boats were collected at Cherbourg, ready to make raids across the Channel to bombard our seaports and towns; and the great loss sustained by this country at the outset of the Russian War of 1854, owing to the want of suitable gunboats to accompany our fleet to the Baltic, ought to have taught us a lesson not easily to be forgotten. I dare say some Officers are present who can support me in the opinion that if a gunboat flotilla had been sent with the fleet to Cronstadt, the north passage of that island might have been cleared of obstructions, and a sufficient force might have gone up to St. Petersburgh to have dictated terms of peace, and thus have brought the war to a close almost at its inception, with a saving of millions of money, and of an immense sacrifice of human life and misery, and this might have been foreseen by a strategical study of the charts we possessed, during the preceding winter. It will be remembered that, in making the discovery of the defenceless condition of the north channel at Cronstadt, some efforts were made on the spot to improvise a flotilla force by mounting guns in native craft which were captured for the purpose, but it was too late that year, and the following year when some gunboats accompanied the fleet, the Russians had found out their weak point, and by taking locomotive engines off their railways, showed front with twenty-seven gunboats mounting heavy guns against about half that number which England had provided during the second winter months. I need not dwell on this unfortunate occurrence except as regards the effect it produced, which was displayed by our employing all our resources for the production (when too late) of some 120 gunboats, which affords the strongest evidence of the value then placed on this arm of the Service. This flotilla force has now mostly disappeared, and what remains is too obsolete for its intended purpose.

There can be no doubt that, in future wars, shore batteries will have so far obtained superiority over ships, that close engagements will be avoided by the latter, and that bombardment at long ranges will be resorted to where it is deemed operative, in which mode of attack a flotilla protected by ships will bear a conspicuous part; and it is quite probable that our clever neighbours have had this in view when the demand was lately made for an additional force of fifty gunboats in the present year's estimates. We may be thankful to find that their financial embarrassments have stood in the way of the realization of this intention, but our rulers should take note of the threat which has been thus thrown out before they allow the theory to prevail that adequate security can be afforded to our coasts by sea-going cruizers in combination with submarine mines and shore batteries and torpedo-boats, and without gunboats, and this is the main point for discussion which I desire to keep before the meeting, and which should be considered in all its various aspects.

My argument is that the gunboat feature still holds the field both as regards efficiency and economy, as apart from other advantages, for the same money four times the power of artillery can be brought into action, and that whilst gunboats could stand their ground inshore or under the protection of their batteries, and could compel any armour-clad to keep her distance, these cruizers would be liable to be driven off the coast or captured by a superior force, and moreover that whilst a flotilla can be provided very quickly, the larger vessels would have to be waited for for years in the event of any great disaster to the fleet. The argument for delay is sometimes advanced on the grounds that a flotilla force can be quickly provided on a threatened aspect of war, but I cannot for a moment agree with those laggards who, relying on our great manufacturing resources, would wait for the evil day in order to provide the necessary force for the defence of our coasts, with an enemy fully armed in this respect at our doors: our weapons should not only be ready at hand but kept bright and accustomed to use by a trained band of volunteers.

Sir Andrew Clarke has set a good example to our naval authorities by forming the nucleus of a corps of submarine mining volunteers; and yet the duty of raising an adequate force of naval volunteers to man our torpedo-boats and gunboats is allowed to stand over, whilst no effort is being made to settle the urgent question of whether the expense of providing a flotilla is to fall on local rates or on the public purse, and thus we remain totally unprepared for a war of great magnitude such as is evidently looming in the near future.

Turning from general remarks on this subject, I will now offer some opinions with regard to the qualifications these modern gunboats should possess, and the tactics to be pursued in view of the services to be rendered, which point to the requirement of two classes, the first class to possess considerable speed and to take the place of coast defence vessels of the "Glatton" type, and the second class for purely local defence where a high rate of speed would not be essential. Both classes should be armed with one very powerful armour-piercing gun protected by a semicircular shield of stout

armour-plating for end-on fighting, which would be their special mode of attack and defence, besides carrying a number of quick-firing and machine-guns for defence against torpedo-boats. The first class gunboats should in my opinion have two military masts on which fore-and-aft sail could be set in case of need, also a flying square foresail, but I do not wish to bring upon myself on this occasion strictures on the strong opinions I entertain against the idea of depriving any sea-going vessel altogether of the auxiliary use of sail-power to meet the unavoidable incidents peculiar to steam navigation, although as it appears to be considered indispensable that all war vessels should have one military mast, my advocacy of a second mast as a provision of safety cannot reasonably be contended against.

The efficiency of the modern gunboat will be correlative with the power of gun which is brought into action, and the amount of resistance to penetration afforded by the armour-plated circular shield and also by the facilities of motion supplied for maintaining an end-on position both when advancing and retiring within range of fire, and in the latter case without loss of speed, the advantages of the hydraulic propeller being most conspicuous for these as well as for other purposes. This mode of propulsion for gunboats is moreover highly important, as enabling those vessels to pass over floating obstructions with impunity or touch the ground in shoal waters without risk of disabling the propeller; the experimental results hitherto obtained of this motive power fully justifying its adoption in gunboats where the *highest* rate of speed is not an essential element of efficiency. The present mode of applying screw propulsion in torpedo-boats is only excusable on the grounds of obtaining the greatest possible speed in combination with very light draught of water. The plan of working the screw blades partly below the keel presents many very objectionable features for inshore work, which invites floating obstructions being placed wherever feasible as a certain means of fouling the screw, and in the shoal and rough waters of inshore navigation the liability to disablement by touching the ground is very great, but in all light draught of water vessels, provided that the diameter of the screw propeller is limited to the line of keel, it is already assured that the hydraulic propeller will prove equal to the screw in smooth water, and superior in a sea way; light draught of water for passing over shoals being an essential feature of efficiency in any flotilla force. The turbine also supplies the means of retiring stern-on, without loss of speed, great pumping power, and is perfectly noiseless, noise being a serious defect inherent in screw boats. I would call special attention to another great merit which the turbine possesses for this gunboat class, that of enabling the gun to be kept pointed on the object without training; thus reducing the necessary size of the port-hole. This accomplishment is placed under the complete control of the Officer in charge of the gun without any orders to the engine-room or interference with the engines, but merely by working the valves which regulate the outlet flow of water from the discharge nozzles. The twin screws cannot comply in any degree with this direct and complete control over the movements of

the vessel. I am glad to see that Mr. Ruthven, whose system of hydraulic propulsion has already proved so successful, is present, and who will throw some light on its future prospects.

I am aware that the mention of a moderate speed is always open to contention, but as the operations of the smaller class of gunboats will be in close vicinity of the land, I consider that the moderate speed of 12 knots would be sufficient; for instance, these smaller gunboats advancing a few thousand yards from the land in order to get within range of a vessel intending to bombard could always retire in safety if pursued: why then increase their size and cost in order to obtain an excess of speed? The service required to be performed by the larger class of gunboat completely alters the conditions as regards a high rate of speed. These "Guarda Costas" would be stationed at different ports ready to concentrate at any point threatened by the appearance of an enemy, and as sea-going vessels, a high rate of speed and perfect seaworthiness would be an essential element of efficiency, as well as a larger coal-carrying capacity. I could not without the assistance of a draughtsman arrive at anything like a correct approach as to the dimensions and displacement of these gunboats, but as a rough guess I should say that the smaller class would be vessels of about 800 tons displacement, and the larger class about double that size, and there is nothing to prevent their mounting a 12-inch B.L. 43-ton gun; but if Colonel Hope's system fulfils his expectations, a much lighter gun will suffice to penetrate any armour a ship can carry. The effect of the approach of one such comparatively little antagonist can well be imagined, especially after one successful blow has been struck home.

Since writing the above, an eminent shipbuilding firm has been good enough to afford me the following approximate dimensions and cost of these two classes of gunboat:—*Large Class:* 220 feet by 40 feet; displacement, 1,800 tons; speed, 17 knots; guns, one 63-ton B.L. and eight quick-firing; weight of protective armour about 150 tons; horse-power, 4,000; cost, about 85,000*l.* *Small Class:* 160 feet by 35 feet; displacement, 900 tons; speed, 12 knots; guns, one 45-ton B.L., and eight quick-firing guns; weight of protective armour about 120 tons; horse-power, 1,200; cost, about 40,000*l.*

The increased cost and size of the modern protected gunboat of this type is only proportionate to the increased cost and size of modern protected war ships necessitated by the weight and cost of guns and armour. If efficient protection against bombardment at long ranges is sought for, torpedo-boats alone will not secure it, and if a higher rate of insurance be not accepted, our seaports and towns must await the inevitable consequences in the event of war; in this respect other nations are setting us a good example by preparing a gunboat flotilla for coast defence, although their seaboard is far less extensive.

The tactics to be displayed by these gunboats would be to separate as widely as safety would permit, so as to operate if possible from opposite directions of fire, and thus obtain a broadside view of an

enemy, always securing a retreat into shoal water in case of pursuit, and practising a frequent change of range as a deception.

This question of flotilla defence points forcibly to the necessity for a large force of trained naval volunteers such as the "Inscription Maritime" gives to France, always ready for immediate service on the outbreak of war; but at present the best prospect of such wants being provided in the near future lies in the maintenance in office of a Government which is carrying out the policy of Imperial defence, and which will now have the support of a Chancellor of the Exchequer who as a late First Lord of the Admiralty displayed whilst holding that office a sincere regard for the interests of the Naval Service. But it cannot be concealed that there are threatening aspects on the political horizon indicating a return to a policy of retrenchment which may lead to a battle being fought in England such as is now being waged in Germany, to ascertain whether our Empire is to be protected by an Imperial or a Parliamentary navy, whether in fact economy which entails the risk of a great national disaster is popular with a democracy, also whether adequate protection against any probable hostile combination against us is compatible with a navy inferior to the performance of its manifest duties. I am supported by very high authority in saying that I do not discern any party privilege or tie to prevent my denouncing a policy of economy which does not secure naval efficiency. I therefore venture to assume that I shall not be out of order in referring to this subject as a matter which may be discussed before this Institution without trespassing on the forbidden ground of party politics. The discussions which take place in this lecture hall are commented upon in the press, and have therefore a wide circulation and thus become a means of enlightening public opinion, and economy as applied to our coast defence is a matter upon which professional Officers are most competent to form a sound opinion; I therefore venture to say that if these political economists who are now calling out for retrenchment will only fight their battles on the broad question of the comparative strength of the navies of Europe, and the greatly increased interests at stake, they will be ignomiously defeated; but if they are wilfully blind, as they seem to be, to the force of argument on this basis, then they are false guides who should be denounced on every public platform. During the last two years, in consequence of the scare produced by the advance of Russia on our North-West Indian frontier, some progress has been made towards increasing the strength of our Navy, and some provision also made for the defence of our coaling stations abroad, and of our Colonies, and some of our seaports at home; but a reaction is now setting in under the disguised form of wasteful expenditure, and once more the cry is being raised in the arena of high politics against extravagant estimates and bloated armaments, which offers no solution and prescribes no remedy but such as must prove fatal to our naval efficiency under the pressure of political expediency.

The word *efficiency* in its relation to the Navy is prostituted by the sense in which it is combined with that of economy, as all experience

proves that the only result of so-called economic reform has hitherto been shown in a reduced expenditure on what constitutes naval power. The phrase "*adequate Navy*," so popular in the mouths of would-be patriots, is as deceptive as it is an unknown quantity, and the extravagance and wasteful expenditure which is attributed to faulty naval administration should be traced to its fountain head, the House of Commons, whence have arisen such burdensome demands for statistics and documentary evidence of the most minute details of management and control as would swamp any industrious undertaking. The meaning of the words *an efficient and an adequate Navy* is never fully grasped and is not held up to an impartial and cool inspection, and the familiarity of the sound has trodden out the sense of these words, and they meet with various interpretations according to the ruling or depth of sincerity which influences the speaker, often too easily discouraged by financial considerations which would disappear if men would only be honest in the use and interpretation of words, and there never will be any permanent ruling of these familiar expressions until the numerical standard of superiority in ships of the British Navy is defined by Act of Parliament. I maintain that if any good effect is to be produced by the coming debates in Parliament, inquiry should begin at the fountain head, the source of most of the extravagant expenditure which is said to exist, and which will be found to originate from the constantly growing demands for superfluous and burdensome Returns and accounts such as are produced in the Parliamentary Blue Books, the keeping of which affects the entire productive operations of the dockyards and executive branches of the Service; an estimate of the actual cost of which Blue Books, including not only the clerical and actuarial labour involved but the loss sustained through the general disturbance of practical work in all the productive departments, would prove very enlightening, and if men engaged in like business matters in the private trade were called upon to report how this encumbered system would react on the efficiency and profitable management of a manufacturing or shipowning company, I venture to say that they would tell you that it is not only non-essential to a careful watchfulness over expenditure, but far in excess of any useful requirement, and could only have one result, namely, that it would lead to speedy bankruptcy.

There is another reform of the same character from which economy combined with efficiency would certainly be obtainable, and that is, from a large measure of decentralization of administrative authority, and consequent reduction of most unnecessary correspondence. The economy that would result from such a reform would be found in a large diminution of the clerical staff of the Naval Service, and greater efficiency would follow through the improved *morale* produced by higher responsibility being thrown upon executive Officers.

The Lords of the Admiralty would have more time to attend to essential duties instead of being occupied with minor matters of detail, and delegated authority would conduce to discipline by exalting

the status of Commanding Officers, who under the present system have to a large extent to be guided in all matters by permanent civilians who have no professional experience. The annual expenditure thus saved to the country would alone suffice to maintain an efficient force of naval volunteers to man a flotilla for coast defence, in fact, we want local government extension for the home ports. It can also be shown that wasteful expenditure, to a very large extent, might have been prevented if Parliament had not *persistently refused* to incur the expense of a scientific committee of experts to report upon all new designs for ships of war which would have secured a wider scope of intelligent inquiry into this intricate problem without abrogating from the responsible position of the Naval Lords of the Admiralty.

The fact which presents itself to our special notice at the present time, of a serious error found to exist in three of our latest armour-clads and five or six of our latest armed cruizers of the "Australia" type in their estimated displacement, fully exemplifies the great advantage of a consulting Committee, representative of the most advanced and intelligent school of scientists, to deal with such a complicated subject as a matter of precaution, whereas to limit the scope of inquiry to the officials who are already compromised by their previous decisions, and who inevitably fall into a groove of thought, is to incur the risk of extravagant failures. These vessels being now immersed considerably beyond their intended line of flotation have greatly diminished their belt protection and their speed, both being properties of paramount importance to their efficiency as war vessels. There have been many defects in the designs of war ships discovered when too late for repair, which would probably have been prevented by a wider scope of investigation such as is provided for by all other naval Powers of Europe.

The present system of Parliamentary vexatious interference with naval administration is what clogs the wheels of economy and efficiency, and on the outbreak of a war this existing centralized system of administration must fall to pieces, and individual authority would be called into action in the same manner as is now exercised to some extent by Commanding Officers on foreign stations, without tending to any extravagance; and there is no doubt that delegated authority and responsibility will always encourage zeal and activity.

The management of the Royal Dockyards is made a constant subject of attack, whereas it is a well-known fact that the work performed is of a better quality and less costly than contract work; and the best evidence afforded of the efficiency of the artizans is, that whilst both Officers and men are less highly paid than in private yards—a gang of dockyard men on one side of a ship have always beat the heads off a gang of hired men from the trade when employed on the other side—and the skill of the Officers is fully recognized by the eagerness with which their services are sought for on their retirement from the service of the Crown by private engineering firms. The capacity for productiveness of our Royal Dockyards has been neutralized in order to favour the interests of private builders

and manufacturers, thus the manufacturing profits which could be realized on the capital invested in docks, basins, &c., have been sacrificed, and it is clear that all money, which for naval purposes in times of peace is not so employed as to maintain those productive establishments in their highest state of readiness for a sudden outbreak of war, constitutes a loss of power, as it will necessitate an immediate demand for men and additional plant when war is declared, causing delay and confusion at a time when to strike the first blow, and to strike home, will be an advantage which may decide the fate of that war. It would therefore be well if the Intelligence Department lately formed would study this question with a view to the reduction of the contract vote, and the greater state of preparedness of the productive establishments of the Crown. The present system has also the great disadvantage of immediate exposure of our latest improvements in designs of ships of war.

I have now to thank the meeting for their patient attention to my reading of this paper, and to ask their indulgence for having to some extent deviated from the subject-matter of my text; but my excuse for raising the question of finance is, that we are told we must look to a sound financial policy as the only source from which adequate and efficient armaments of every description can be expected. And surely those who will have to fight the battles of this country have a paramount interest in the study of this question of "ways and means," and naval Officers must be more than human if they can calmly submit to the prospect of having unnecessarily to contend against superior forces of the enemy, whilst politicians are playing fast and loose with financial policies, one day influenced by a paroxysm of fear, and another inflicted with a blind impulse of false security. The consequences attending these conditions of unrest and unwisdom should be brought home to the minds of the electorate through every possible channel, so that the popular cry of retrenchment,—an appeal which is made to their pockets to influence their votes,—may appear in its true light as being the surest road to great national disaster. Naval Officers may well deride the costly statistics which are intended to guide the path of legislation when they find that whilst these statistics disclose the fact of our increasing wealth, and population, and commercial enterprise, statesmen are found in high places arguing for a reduction of the Navy Estimates to a scale of insurance commensurate with what was deemed sufficient years gone by, when the navies of Europe were far below their present standard of efficiency, and when the cost of war material was comparatively insignificant. We are reminded of the weakness of our attempt to keep our Navy in the necessary condition required by our position among nations, by the remarks of Lord George Hamilton, who shows that during the last ten years, while France has increased her naval expenditure by 39 per cent., Germany by 43, Russia by 45, and Italy by 133, our increase has been only 16 per cent. But this question of inadequate naval strength is one which deeply concerns the *morale* of the British Navy, as it must always affect a weaker combatant when called upon to contend against

a more powerful foe, and naval Officers can only view with feelings of regret and remonstrance the efforts which are being made to render their profession unpopular in the eyes of the public by indiscriminate charges of wasteful expenditure and extravagance, whilst the fact stares them in the face that our naval superiority is jeopardized to a most dangerous extent.

It is hardly possible to understand how, in the existing state of Europe, the vital interests of the nation which are at stake in this question of proportionate defence can be made the instrument of political strife and pitiful verbal controversies which are the refuge of incapacity and frivolity.

It is often said that as a nation we are proud of our Navy, and recognize the paramount share that is allotted to it in the task of national defence, but unfortunately this knowledge is not seen to be commensurate with the pride and interest displayed in its welfare.

In conclusion, it is very gratifying to me to be able to claim in support of the opinions I have expressed on the financial aspect of this question, some remarks which have fallen from the Chancellor of the Exchequer, Mr. Goschen, since this paper was prepared for the printer. I quote from his speech addressed to the mercantile classes at Liverpool, on the 21st ultimo, the following expressions: when speaking on political economy as applied to naval administration, he stated as follows:—

"I know it is said that our great public departments are infinitely more extravagant and spend more money with less results than private firms. That is so, no doubt; but here, again, the public might support the Government in economy in many ways. Why is it so difficult, for instance, to conduct our dockyards with economy? Because the Government *has not got that discretion, has not got that free hand*, which the shipowners of Liverpool have in dealing with their own concerns. . . . . You must make allowance for those difficulties. But you can support the Government in this, by not insisting *upon laming the arm of the Executive*—if I may use the term—at every point, by immediately coming to the front when any strong and severe administration bears hardly upon any friends, or class in whom you have an interest. I am quite sure that if our friend Mr. Forwood at the Admiralty, in his capacity of one of the financial officers of the department there, were to cut down expenditure with a vigorous hand, he would find that there are many members of Parliament who speak of economy in the abstract, who would make it extremely uncomfortable for him in the particular case in which he practised it. The Government is bound—and I am delighted to think that there will be probably a general agreement of opinion with regard to this question of overhauling our expenditure—the Government is bound to look thoroughly into every item of expenditure, but I have thought it right to give this warning, if I may call it so, that sensational experiments might easily end in decreased efficiency, and in that kind of spasmodic action which is *the curse of our administrative system*. Sometimes the country is for economy, and you *reduce and starve* the Services to a certain

want. Then in a hurry comes a scarcity, and the estimates are raised again, and things are done in a hurry which had much better have been done carefully and quietly and consecutively. I have said sufficient to show you the spirit in which I consider these questions ought to be approached. The Government can do much in the reduction of expenditure, and they are determined to do their best in that direction, consistently with *maintaining the Services in a good state of efficiency*, as every part of this community—every part of Great Britain and Ireland, and especially our great working and industrial classes, our great industrial and shipping centres, are *entitled to demand*."

I would also quote the words of that great financial economist, Mr. S. Laing, in his letter to the "Times" of the 4th instant, where he says—

"The result of my experience is that *efficiency* is the first condition of real economy. If estimates are unduly pared down to produce popular budgets, expenditure is certain to come back with compound interest. Mr. Gladstone is never tired of referring to the halcyon days of Sir Robert Peel's Naval and Military Estimates. How many thousands of lives and millions of money did those estimates cost us in the Crimean War? How much have we spent since, hurriedly and badly, in supplemental estimates whenever a Russian scare or a Continental war brought home to us the conviction that our Army and Navy were not in a state of sufficient preparation?"

Captain FITZGERALD, R.N.: As I do not see any of my seniors rising to open the discussion, perhaps I may be excused for making the few remarks I mean to offer in friendly criticism of Sir George Elliot's paper. I may say in the main that I agree with all the latter part of his lecture in the necessity for adequate defence of our coasts. It is only on the technical detail of that expenditure that I venture to disagree. I think the class of gunboats he has put before us in order to be of any use for the effective defence of the coasts of England would have to be provided in very great numbers. They would have small power of mobility, and small coal-carrying power, consequently there would have to be a very large number of them in all our harbours, as it would be unknown on which point the attack was going to be delivered. Then, of course, it is all a question of expense as to whether the money which we find so much difficulty in spite of all our warnings and talkings here to get out of the taxpayers for their defences, will be better expended in that or in any other form. This, I presume, is only a rough sketch of the boat that Sir George Elliot intends to build. It does not quite seem, looking at it as a seaman, that that vessel would float; I imagine it would turn bottom up. He gave us dimensions which I do not presume to criticize for a moment. But as to the question of speed, I should say that in a vessel of 800 tons mentioned, carrying a 43-ton gun, an enormous armoured shield, coal, and so on, it would be absolutely impossible to get a speed of 12 knots with the turbine. I was always under the impression that the turbine had been, well I may say absolutely, condemned by experts and seamen alike as a mode of locomotion as against the screw. That is a question that *may* be open to doubt, but I should think not. With regard to manning the vessels, Sir George Elliot speaks of volunteers. I imagine there would be very great difficulty in keeping a sufficient corps of volunteers in any state of readiness. I suppose we should want 100 gunboats to be kept ready in peace-time. Whose charge would they be under? How would they be organized? Where would the vessels be kept when we talk about keeping our arms bright and ready for instant use? The vessels would be hauled up on slips or kept in harbour. Besides these, volun-

teers could not give up much time to learn all the complicated drill for the scientific weapons which they would have to work. I am therefore afraid it is an unpractical thing to talk of Volunteer Corps. We might manage it in the submarine mining business, fishermen going out so many days during the year in company with experts, but to man a flotilla of gunboats of that sort to be of any use to the country it would be out of the question to expect to get volunteers. Moreover, I hold that having the whole of the naval organization under the Admiralty is essential to success. I do not know who would command those vessels, and as to whether they would be able to do it, and to manipulate all the weapons of modern warfare, one might be very doubtful. One thousand eight hundred tons is the size of the large gunboat Sir George Elliot mentions, but it seems to me that if you go to that size and expense, 85,000*l.*, the money would be very much better expended in a *bonâ fide* sea-going vessel of the "Cossack" or "Porpoise" class. They are very much better worth the money than gunboats. They are *bonâ fide* sea-going vessels, powerful, fast, 19 knots, carry coal, and would be very little, if any, more expensive than that class of gunboat. I cannot help thinking the power of mobility is a great thing, being able to choose your own time for action, to follow up the enemy, and not fight under the defence of your battery. You might keep off skirmishers, but I do not think these vessels would have any material effect upon an enemy bent on destroying a town or harbour, or even an unfortified town. It might keep off a very small squadron but not an attack intended to strike home. Sir George Elliot, speaks of a Committee on Naval Designs, and I must say, I was rather of the opinion that it would be a good thing to have a number of Committees on Designs. But I saw a very good answer in the House of Commons recently to that question, that the tendency now was, when a failure was made, to distribute the responsibility amongst a number of people, and they never could saddle the right horse. A Committee of Design would be a splendid thing for the builder; he would say, "Oh, well, it was passed by the Committee of Design;" that means nobody; they could not put their finger upon any one. I cannot help thinking the more you can concentrate it, and fix one man with the responsibility of a design, the better; but do not throw the responsibility on a Committee of Design, because you would never be able to put your finger upon any one who had made a mistake. With regard to the latter part of Sir George Elliot's paper, I must say I agree very much with almost everything he said about the difficulty of making people understand that they cannot have the proper defence the moment they want it; that if you want to be ready for war, you must spend your money beforehand. That is what the British taxpayer will not understand; namely, that he cannot have ships at a moment's notice, and that the war may be over before he can get them, and I do not know any way that it is possible to make him understand it, except the experience of a war.

Mr. Delebere Marsden, R.N.A.V.: I should not presume to address this meeting were it not for the fact that I see none of my superior Officers present, but as Mr. Seth-Smith some time ago asked me to bring the claims of the Royal Naval Artillery Volunteers into notice, if I should see a suitable occasion, I venture to offer a few remarks. I am particularly moved to do so by what the last speaker said with regard to entrusting gunboats of the class the lecturer has laid before us to Volunteers. Of course you could not expect Volunteers, as at present constituted, to take charge of the very complicated machinery that modern ordnance requires; but as far as the Royal Naval Artillery Volunteers have gone with their limited opportunities of exercising with the ordnance which have been given them, the results have been very good. I believe most Commanders of gunboats who have seen their practice will bear me out in what I say, that with the 64-prs. they have obtained results which compare very favourably with the results obtained in the Navy. Of course if the system the lecturer has wished to bring about were carried out, you would have some of these improved vessels and ordnance stationed at each port where a corps of Volunteers was raised, and they would be available for practice and drill in time of peace, and in time of war you would then have, I do not say gunners who would at all approach the seamen-gunners of the Royal Navy in efficiency, but at all events you would have rough material which had approached the matter, and had attained some familiarity with the weapons which they had to

use. With regard to the Corps, most Officers present are aware of the results which have been obtained by the Royal Naval Artillery Volunteers, both in London and in other parts of the country, and I hope I shall be excused if I say a word for my own corps on this occasion. Most people who are acquainted with the condition of the force know that the numbers of the London corps are very much less than those which are attained either by Liverpool or Bristol. It is because I venture humbly to suggest a reason for that state of things that I speak now. The place of drill we in London are given is at an enormous distance, and the consequence is that men who are hard at work all day have to spend, in order to carry out their drill at all, the whole evening, and do not reach their homes before a very late hour of the night. What the London corps have been wishing for a long time is that we should have a place of drill, a ship if possible, at all events some place where we could have heavy ordnance in the centre of London, so that we could without inconvenience carry out our drills. I believe if the Admiralty would grant us that, you would see a very large increase in the numbers of the London corps. Of course it is a matter for consideration for the Officers of the Navy whether the corps is in any degree qualified to carry out what it is intended for, but we submit that, at all events, if it is kept in existence at all it should be given the means by which it may prove its capabilities, not only in the manner which I have suggested, but also for providing for it means of drilling with more modern and improved weapons. As a matter of fact I may say what is my own experience. I have belonged to the corps some seven or eight years, and the only practice I have ever had has been with a 64-pr., and the only time that we ever had an opportunity of firing the 7-inch gun was on one occasion when we were on a gunboat, and the ship's company not having expended their quarter's ammunition we were allowed to do so in their place.[1] I think some improvement should be made in that respect, and some opportunity should be afforded us of practising with more modern weapons.

Captain W. B. Henderson, R.N.: I do not propose to criticize the form of gunboat Sir George Elliot proposes; regarding the financial part of his paper, we have lately had an admission from a very high authority how fraught with danger it is to a nation and to international morality if its statesmen are beguiled by the wiles of its naval and military Commanders in the matter of belligerent ways and means. Their proper function is a progressive and economical administration of the powers placed at their disposal, and the reform of abuses; otherwise progressive increase of expenditure so strains the national resources there is fear of an explosion, or vast sums are unproductively wasted in spasmodic attempts to reach ideal states of perfection, which no sooner are reached than they become obsolete. As we cannot possibly prepare to meet the combination of all the world against us, I will offer a suggestion which may go a long way toward helping to supplement Sir George Elliot's views. A system of coast defence may be primarially divided into two distinct operations, first, the defence of fortified positions and strategical points; secondly, resistance to invasion on the coast line and descents on unprotected places. For the former gunboats are most valuable, they should be heavily armed, need not possess great speed, and if they can be provided with a fair defence so much the better. For the latter a higher speed and better sea-going qualities are required than can be obtained by heavily armed gunboats; therefore I incline to the opinion that vessels of the type suggested by Sir Andrew Clarke and Captain Fitzgerald would be best. We are very much in the dark as to our needs and the possibilites of future naval operations. While I do not think it wise to put all "our eggs into the one basket" of gunboats, I am of opinion that development of improved types of gunboats should not be stopped either for offensive or strictly defensive purposes, otherwise we shall be in the same position in regard to them as we lately were after torpedo-boat development was allowed to lapse for three or four years, and suffer proportionately. In case of serious naval war we should have to trust to many extemporized means of defence. Individuals do not waste their means by attempting to keep their wardrobes in an ideally

[1] The only ammunition issued to the Volunteers for heavy-gun practice is for the 64-pr.

correct state. Clothes get out of fashion before they are worn out. When unfit for jaunts abroad, we do not throw them away, but make use of them as long as they will last. Nearer home, it should be the same with our ships, the latest and most improved types will have to be made use of at a distance from home for offensive purposes, while those that get out of the fashion, and are no longer fit for the first line, can be usefully worn out for defensive purposes, both at home and at the coaling stations, where they will supplement the coast defence vessels proper, and be more efficient than extemporized craft. This, though it applies to all classes of ships, especially does so to gunvessels and gunboats. In the case of every ship when ordered to pay off, it should be decided whether she should be brought forward again for active service or be turned over as she stands for coast defence purposes. In the latter instance she should only be dismantled aloft, her stores, guns, machinery, and fittings being kept in their places. In most cases vessels paying off are perfectly fit for such defensive service, it is the fact of paying them off and stripping them that renders them valueless and useless; for the cost and time of replacing what is destroyed by this act is prohibitory as to their use again for any purpose, and not only are the vessels themselves rendered useless, but their armament and fittings after being removed are practically looked on as so much rubbish. Objections may be urged as to the cost of keeping these vessels in order and repair. It need not be great, no alterations should be undertaken, some might be turned over to the local defence corps, others replace the R. N. Reserve drill ships, whose crews would be more usefully employed looking after them, than so doing to the old hulks employed for the purpose, and their armament will be just as modern for drill purposes as that to be found in these hulks, besides saving the cost of mounting and fitting, the remainder, distributed among the naval ports and laid up in the basins, would give legitimate occupation to the crews of the depôt and reserve ships to keep in order, and need cost no more than if attached to the steam reserve as at present.

Captain CURTIS, R.N.: There is one point Sir George Elliot has left out, and that is the defence of the fishing interest. Now at the Fishery Congress the other day it was stated that the money employed in the fishery interest is 10,000,000*l.*, and that 150,000 men are actively engaged in the work,[1] and 1,000,000 lived by the industry. Now unless we can have gunboats or some vessels to protect places like the Dogger Bank, where people fish, that industry must cease. And it is not only the 10,000,000*l.* that is invested, but there is also an immense amount of private money expended in breakwaters and so forth, which all goes to the fishing. Now I think Captain Colomb, the Member for the Tower Hamlets, put the whole matter in a nutshell in a letter to the "Times" of February 1, in which he stated that our Imperial exports and imports were 1,078,000,000*l.*, and those of the United Kingdom, 644,000,000*l.* There is one point that we have often discussed, and that is the duty of the Colonies to contribute to the support of the Navy. I take it that the first instalment the Colonies are going to give us is to build forts to protect not only their towns and harbours, but which will also protect our ships when necessary. I think the second instalment should be to pay an insurance upon the 434,000,000*l.* which represents their annual commerce afloat. I think that is where we must look to for the money. Now we know that Sir George Elliot has a hobby, viz., the turbine. There are marine animals, the squid, for instance, that propel themselves by ejecting water; they take water in and they discharge it. I think the squid closes its aperture after discharging the water by muscular action, and it is in that same way that the turbine will have to be worked out; apparently the application of the principle has been at fault. The late Robert Griffiths always looked upon the screw as a pump and invariably described it as such.

Admiral WELLS: I think the gunboat is a very necessary adjunct to the other defences, but for that purpose perhaps our tug-boats and various small craft

[1] Mr. Maconochie (Lowestoft) is the authority, and said if they added to these the gutters, coopers, boat-builders, net manufacturers, and others, besides the wives and families of the men, it would be found that not less than 1,000,000 people lived by the fishing industry.

might in some way be rendered available as gunboats. The Admiralty lately have entered into contracts with the owners of our large vessels that under certain circumstances they shall be used for men-of-war purposes either as coal carriers, or from their great speed as out-look vessels for squadrons. Surely some arrangements might be made with the builders of our tug-boats so that under certain circumstances they should be fitted for carrying a big gun; that their displacement should be such that they should carry some sort of defence for that gun as well, and that below they might carry a less quantity of coal to make the space available for ammunition, and in that way do the part of gunboats. Why should not each gunboat be fitted and attached to each of our principal ports, and hired for drill purposes occasionally? Then as to the turbine principle of propulsion. I remember the "Waterwitch" going to Plymouth in a gale of wind. They found it utterly impossible, in a sea-way to get her head to wind; she had to heave to and go stern foremost, and during the whole of the bad weather she was hove to in that way. I do not say for one moment that a very shallow double screw would not have to do the same thing, but I think that is one great fault in the application of the principle of the turbine for a sea-going ship in addition to the less speed obtained. Mr. Marsden has given us very good reasons why the Royal Naval Artillery Reserve should be encouraged. No doubt naval men feel that it is a most necessary thing to do so, and also to give them the means of exercising with the most approved weapon that they can have. If ever war does break out, we shall want every man who is willing to go to sea and can keep his sea-legs to do the best he can for us. Commerce will be more or less stopped, so we shall get the benefit of our seamen manning our large mercantile steamers; still a volunteer is better than a man who comes to us, possibly from not being able to do anything better. And judging from the few times that I have been on board Reserve vessels, and having seen the way in which the gentlemen who man them, really work, their shoes and stockings off, scrubbing decks and really going through the hard and disagreeable parts of their duty, as well as the more agreeable portion, I think it is a force that we as naval men ought to do everything to encourage.

Lieutenant TUPPER, R.N.: I should like to ask Sir George Elliot if he can give the meeting information of the highest speed at which a ship has been driven by hydraulic propulsion, and if any vessel has been driven at higher speed than has been attained by the turbine-boat at Portsmouth? In that case the turbine was fitted to a torpedo-boat, and I have never seen her go more than 9 knots; if any higher speed has been got by that method of propulsion, I think it might be a very excellent one to adopt. I also must take the liberty of differing with Captain Fitzgerald about Volunteers. Evidently we cannot possibly afford to keep permanently a sufficient number of blue-jackets and stokers to man our Navy, for even in peace time we often have a great struggle in manning our ships on commissioning; we *must*, therefore, have some means of getting enough men to man our coast defence ships in war time, and, as far as I can see, the Volunteer movement supplemented by the Reserves is the only one to have recourse to. In days of old everyone used to learn as a boy how to take part in the defence of his country, now, however, boys are principally educated in making money, consequently however willing they might and would be to help in case of invasion, the masses would be almost useless, but I feel sure that if only they were organized and instructed as Volunteers they would be glad to learn and be of much service in the hour of need. If the Government will not provide these gunboats, local government boards of unprotected seaports ought to consider the question themselves, and put it before their rate and tax payers to see whether they are prepared to put their hands in their pockets to provide these very necessary means of defence and consequent insurance for their own property.

Mr. M. W. RUTHVEN: I think the gallant Admiral does not do justice to the hydraulic propeller. He gives the idea that the hydraulic is only fitted for shallow draft vessels and moderate speeds, and that it is not so good a propeller as the screw even then. Now I am quite satisfied that it is best fitted for very high speeds and large vessels; and I can prove that the hydraulic was superior to the screw as a propeller in such vessels as the Admiral proposes. I think I can very shortly prove that the trials of the "Waterwitch" showed that the hydraulic had a superiority of

at least 30 per cent. It will be allowed that the coefficient, $\frac{V^3 \times MS}{I.H.P.}$, should be invariable when obtained under similar circumstances, and that any variation must be due to errors. Referring to the trials of the "Viper," "Vixen," and "Waterwitch," it will be seen that the coefficients of the "Viper" class varied from 243·6 to 438·5, a difference of over 80 per cent., this is so great a difference that it proves great errors. But something near the truth may be arrived at by comparison with other screw vessels, for instance, the "Philomel" class, fitted with engines and boilers of the same power, had a coefficient of 274, assuming this to be correct, 270 may be taken for the "Viper" class; of the latter their designer stated that they were very bad forms for propulsion, consequently should have a lower coefficient than the "Philomel" class. Taking 270 as the coefficient, at 9·3 knots the power must have been 1,000 indicated horse-power. The power of the "Waterwitch" at that speed was 759 indicated horse-power, showing 31·7 per cent. superiority. Again, the "Philomel" class required 1,004 indicated horse-power for 10·8 knots, with a cross section of 217 square feet. Allowing that the "Viper" was as easily propelled as the "Philomel" class, the "Viper" would require, with her cross section of 336 square feet, 991 indicated horse-power for 9·3 knots; the power of the "Waterwitch" was 759 indicated horse-power, showing 30 per cent. superiority. Again, another way of approximately finding the power of the "Viper" class. According to Rankine the force to propel such a vessel as the "Viper" at 9·3 knots would be 13,500 lbs., and according to Froude 38 per cent. may be taken as the value of the screw in such a vessel; this would give 1,012 indicated horse-power, the "Waterwitch" having 759, shows a superiority for the hydraulic of 33·3 per cent. Thus three different modes of arriving at the power of the "Viper" class agree, and prove the superiority of the hydraulic to be from 30 to 33 per cent. above the screw as a propeller. As to the manœuvring power of the hydraulic, the "Waterwitch" was found to stop from full speed in the length of the vessel; it is allowed the screw could not do this. As to turning they were not tried in the same way, the "Viper" was tried running round a circle, and consequently going end-on through the water, the "Waterwitch" was tried turning in her own length, thus going broadside through the water, a manœuvre taking longer time. The "Waterwitch" went astern nearly as fast as ahead; so as the "Waterwitch" stopped quicker, went astern quicker, and could turn in her own length, the manœuvring power is therefore greater than the screw. I may remark that the trials were in comparatively smooth water, the screw at sea often loses very much of its propelling power from getting out of water as the ship pitches, the hydraulic entirely avoids this loss, keeping always the same steady pressure of propulsion on the ship, which could not fail to raise its superiority still further, and I may add that the liability of the screw to be fouled or broken by floating wreckage is a danger that the hydraulic is entirely free from. In the case of heavy leakage, as the whole power can be applied to pumping, and at the same time propelling, a leak that would sink a ship in five minutes can be kept down. As to high speeds, I am perfectly confident from my knowledge of the subject, that with the hydraulic I could propel the largest ships at speeds beyond anything attainable by the screw.

The CHAIRMAN: I do not wish to take up the time of the meeting, because I entirely agree with the principles that Sir George Elliot has laid down; and without going into details, I think he has called attention to a very important subject which ought to be carefully considered by those who are responsible. Ships when attacking a mercantile port at long range for the purpose of raising a contribution or any other purpose are, like other ships, subject to three modes of attack, viz., the ram, the torpedo, and heavy artillery fire; and though, of course, the ram will not have to be encountered in this case, yet if we depend for defence only upon torpedo-boats, we neglect the powerful means of assailing our enemy by bringing a heavy fire of artillery to bear on him, for which purpose gunboats are admirably adapted. We cannot afford large sea-going war-ships for that duty, which had much better be done by local forces. Mr. Marsden has pointed out that in the Royal Naval Artillery Reserve we have a force which, if enlarged and properly trained with modern guns, would entirely meet what is necessary for the working of

heavy guns in gunboats ; and I am not at all afraid that we shall not find round the coast efficient stokers, engineers, and Officers to work and command gunboats, retired Officers and others who would not be wanted for service at sea. Having made these few remaks I will now ask Sir George Elliot to make any reply that he wishes to offer.

Sir GEORGE ELLIOT: Captain Fitzgerald, as far as I can understand, proposes as a substitute for the gunboats that we should have vessels of the "Porpoise" class. Now we have got something distinct, and that is exactly what I want. The "Porpoise" class is an unprotected vessel, and I think that one of my gunboats would make very short work of half a dozen "Porpoises." I believe they might fire at the gunboat all day, but that one shell from the gunboat would destroy the "Porpoise." I gave my reasons in the paper, and therefore I need not repeat them, why ships cruizing at sea are not to my mind the same security as local defences. Captain Fitzgerald stated that the "Waterwitch" had been condemned: I ask him on what ground, and where is his authority?

Captain FITZGERALD: If she was a success, why were not more built?

Sir GEORGE ELLIOT: Well, I will try and answer that question, but before I do that I will give you *my authority* why she was a success. Mr. Andrew Murray, the Chief Engineer at the Admiralty, would not have been there if he had not been considered by the Admiralty a competent person. He was appointed to superintend the trials of the turbine in one of three sister vessels, the "Waterwitch" being one. The Admiralty carried out all those trials themselves, all the figures connected with those trials were Admiralty figures. The result was that Mr. Murray, who had charge of all those trials, reported to the Admiralty, and it is on record, "that he considered that the turbine in the 'Waterwitch' had proved equal to the screws in the sister vessels, and would beat them in a sea-way." Sir Spencer Robinson, Controller to the Navy, reported, and that is on record, that he considered the success of the "Waterwitch" was so great that it deserved another trial in a larger vessel of greater speed. I have endeavoured all my life almost to get another trial. It is quite true I have not succeeded. Well, first of all the expense of a new thing is greater. The Admiralty would have, as I was told, to take some responsibilty for this new trial. The naval constructors always prefer their own vessel. In the private trade it has on several occasions been on the point of being tried. I have got private individuals to offer to put it into a yacht, and when it came to the point, double the cost was immediately charged for this new kind of engine. Vested interests are against it. Bring forward the turbine to-morrow as a success, and a million of money will not pay for the plant that will be thrown out of gear throughout the country. Go to any man to-morrow, and ask him what he will charge to make engines for specified vessels, with hydraulic engines or screw engines, and he will charge you double for the former, and rightly too. He has to make everything new; all his models, drawings, his workmen have to be instructed, everything has to be adapted for this new machinery. I need not go on any further. There are many other reasons why it has not been tried, but so far as it has been tried in the "Nautilus" against the Citizen boats, exactly similar vessels,—the "Nautilus" was larger with the same power,—she beat them all. After Mr. Murray's report I had the "Waterwitch" at Portsmouth, and by altering the entrance of the water into the turbine I gained half a knot of speed, so that she beat the "Vixen" and "Viper." I will answer at the same time another question put to me by Admiral Wells. The "Vixen," the "Viper," and "Waterwitch" were sister vessels; they were put to sea in the Channel. They all three nearly turned over: they were found so unseaworthy that their crews declined to go to sea in them. Two of the vessels were lightened and convoyed out to Bermuda, where they have been ever since, and the "Waterwitch" was taken up and put up the harbour at Devonport, until I had her brought round to Portsmouth to try an experiment. They dared not send these vessels to sea,—Why? Not on account of the steam engine or the turbine, but on account of the vessels themselves. Now I am not going to condemn those who designed them, because Sir Edward Reed will tell you he was ordered to do almost an impossibility; he was ordered to build those gunboats with an armoured belt, and of a certain length to go through the locks into the lakes of Canada, and consequently he was tied to

proportions. The result was that they were totally unseaworthy, but that had nothing to do with the turbine. Now if Sir Spencer Robinson, the Controller of the Navy, considered that it was a success, if Mr. Murray, the Engineer, reported it to be a complete success, I want to know from Captain Fitzgerald on what ground he says it was a failure. I am certain that he wants to do what is honest and fair by it, and therefore put it to him in that light,—where are the grounds? If I could get anyone to come to me to show me black and white for it, you will convince me directly, but as long as I have these figures before me to convince me of what has been done, I must hold to my opinion. There was one other trial, the Thornycroft torpedo-boat. I say that was a caricature of an hydraulic propeller, and I challenge Mr. Thornycroft to tell me what the speed of his screw boat would have been if his screw had been confined to the draught of water of the other boat, —2 feet 6 inches? The screw shaft was on the keel, and the screw working below the keel. Of course the turbine torpedo-boat could not get that advantage, and yet those two vessels were designed specially for a competitive trial of light draught of water, whilst the one drew 1 foot 6 and the other 3 feet 9. They sent me the drawings of that torpedo-boat. My answer was, if you want to have the perfection of a turbine you must have the turbine as low as possible in the boat. The bottom of it, if possible, opening into the sea: you must have the turbine of as great diameter as possible in order to get the centrifugal force of water, so as to get rapid speed with a smaller number of revolutions, you must have the discharge pipes below the water. But what was that torpedo-boat? A narrow turbine lifted up, canted on one side with a shoot underneath to catch the water and the discharge above water. They got 13 knots with the hydraulic propeller, and the screw boat went 17 knots; but if you had limited the diameter of the screw to the 2 feet 6, I asked Mr. Thornycroft what speed he would have got, and I got no answer, and I do not believe he would have got any more speed out of the screw than he got out of the turbine. With regard to the Volunteers, they are in very good hands to-night. We have been told that they cannot give their time. I say that these gunboats would be right well manned, and that these men when trained would form as good a crew as you could find in the Naval Service. The "Porpoise" is a most valuable vessel, but I should like to know what good she would be to defend one of your naval ports. If a protected vessel came off the port she would knock the "Porpoise" into a cocked hat in no time. There is one more question I have to answer, and it is one that I feel very strongly upon. I do not wish to offend anybody. I believe that we have as clever designers and Officers of the Naval Construction Department as any other country, and I would be the last to throw stones at them, but I say if a man were a heaven-born genius, he could not by himself decide any such complex question as the design for a ship of war as well as a dozen men sitting round a table for about a month or six weeks examining designs and reporting upon them. All the Committee would have to do would be to make their report; the Admiralty would still have the power of accepting the opinion of their own Officers or the opinion of the Committee, or of designing as they have sometimes done on their own account. The other day they built two ships which the Constructors did not approve of. The responsibility of the Lords of the Admiralty remains just the same, but that Committee to my mind would have saved us a great many, at any rate, of those mistakes that we have made, and the enormous loss of money entailed thereby, besides the injury done to the Naval Service.

A MEMBER: May I ask if there has been any further development of the hydraulic propeller since the torpedo-boat?

The CHAIRMAN: I am afraid that has nothing to do with the question of coast defence which is the subject of this lecture. Admiral Elliot incidentally recommended for his inshore gunboats the turbine propeller; but as we are here to discuss coast defence by gunboats, we cannot enter upon a discussion of the Thornycroft torpedo-boat. Nothing remains but for me to ask you (and I am sure you will be very glad to do it) to thank Sir George Elliot for his instructive paper. He has raised points which are of great interest; and I am only sorry that Earl Cowper, who was to have presided, has been unable to be present.

COLLISION, OR GROUNDING MAT.

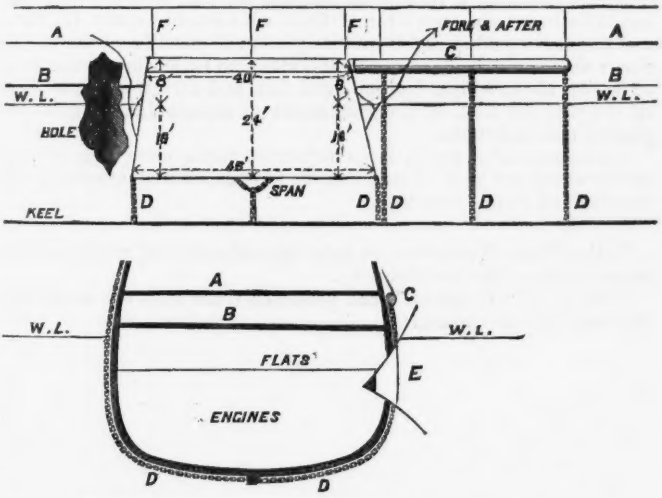
By Commander G. King Hall, R.N.

As an Officer who has served some years as First Lieutenant and Commander, I am convinced that the present collision mat, 12′ by 12′, is of little practical use, and those who know the difficulty of placing these mats and the time required—not to getting it over for drill purposes, but of accurately placing it—will agree with me that if a ship be rammed, and a serious hole made in her, by the time the mat was placed she would be full of water.

I would propose that mats of double No. I canvas should be, when at sea (if considered advisable in harbour), kept permanently rolled and stopped up on the outside of ship ready for immediate use.

"SHANNON."

(Abreast engine room.)



A Upper Deck.
B Main Deck.
C Mat rolled up.

D D Bottom chains.
E Ram of "Shannon."
F F Tricing lines.

Scale $\frac{1}{32}$″ to a foot.

Dimensions of Mat.

Head, 40 feet long, and has a wire jackstay secured to bolts in ship's side, about 8 feet above water-line.

Depth of Mat, about 24 feet, giving about 16 feet under water, the leach having a short fore and after in it, and end kept out when mat is rolled up, ready for immediate use.

Foot, 46 feet (so that the mats should overlap if by any chance the ship was rammed exactly between two mats); and to the foot are attached two iron round bars, 2 inches in diameter (each weighing about 230 lbs.) and 23 feet long.

Bottom chains, going from each end of mat and one from the centre, connected by wire or chain span to the two inner ends of bars, consequently each mat would have three bottom lines.

Brails or tricing lines for tricing up foot when required.

In most of our large ships, four of these mats a side would be sufficient (in some of our smaller ironclads, such as the "Shannon," three would be ample); four of these mats would cover a space of 160 feet, where the large compartments of ship are, as both forward and aft ships are so much protected by cellular compartments, and also by the "run" of ship.

These mats should be always kept on at sea, especially when expecting an engagement: and if in an action the ship were rammed, or a hole made by a Whitehead torpedo, all that would be required would be to cut the straps (or, if fitted with tumblers, slip the foot), and the mat would then fall into its place, and steady taut the bottom lines; this could be done in two minutes; no bother in the middle of an action about whips, bottom lines, fore and afters, all to be bent on and perhaps foul, in the excitement of moment and difficulty of placing mat under fire.

If ship grounded and a large hole were made more than 16 feet under water, the head of mat can be at once cleared away and mat lowered and hauled over hole.

N.B.—These dimensions are only approximate, and might, on trial, require some slight modifications.

I believe if "Vanguard" had possessed these mats she would have been saved from sinking.

Friday, March 4, 1887.

COLONEL D. MILNE HOME, Commanding Royal Horse Guards, in the Chair.

A FUTURE SUPPLY IN JAMAICA OF HORSES FOR THE ARMY.

By Lieutenant-Colonel R. G. HALIBURTON, Canadian Militia (Retired).

The CHAIRMAN: I have to introduce to you this afternoon Colonel Haliburton, who is about to read a paper to us, entitled "A Future Supply in Jamaica of Horses for the Army." Colonel Haliburton has been compelled on account of ill-health to spend a considerable portion of his time in the Colony of Jamaica, and while there he has given his attention to a subject which has taken up the consideration of many Officers and others connected with the Army. I mean the great subject of the provision of remounts for the various portions of the British Army—cavalry, artillery, mounted infantry. Within the last two or three days I have seen a notice of a paper—evidently a very valuable one—read by Colonel Ravenhill, at the Agricultural Hall, and I hope we may see that paper in print, as no doubt it contains very valuable information. I also hold in my hand a letter from Colonel Ravenhill, who expresses his regret at being absent from the meeting of to-day, and encloses a communication, which I will read when we arrive at the discussion. This Institution has not been behindhand in the interest it has taken in this great horse question. Lectures and papers have been given upon it at various times, and of these I may instance three, one by Colonel F. S. Russell, on "Providing Remounts for our Cavalry and Artillery," read in July, 1885; one by Major Hutton, on "Mounted Infantry," in June, 1886, followed closely by Colonel Ravenhill himself, on a "Reserve of Cavalry." On two of these occasions the chair was taken by Sir Frederick Fitzwygram, late Inspector-General of Cavalry, and upon the third by Lord Wolseley, the Adjutant-General, which shows of itself the deep interest that these Officers have taken in this question, and their desire that the members of the Institution should pay attention to the question likewise. That is the reason why I, in my humbler sphere of a Commanding Officer, have undertaken the duties of Chairman to-day, in order to show the appreciation that we, too, have of the burning interest of this remount question.

Colonel HALIBURTON: Before commencing my paper, I may state that I think you are more indebted to your indefatigable Secretary for this paper than to myself. On my arrival home from Jamaica, seeing that the question of the supply of horses for the Army was a subject of discussion, I wrote a letter to him, drawing attention to Jamaica, and he suggested my putting my opinions into the form of a paper, sending a copy to the War Office, and ultimately reading it before the United Service Institution, with a view to discussion. This, therefore, is my apology for appearing here in connection with a matter that all of you know more about than myself. I have paid some attention to Jamaica and Jamaican horses, and if the views I now advance

contain any germs of practical result, no one will be more delighted than myself.

The following suggestions as to the ample capabilities and special adaptation of Jamaica for breeding, at a very small cost, very useful horses for the Army, are submitted in as condensed a form as possible, in the hope that if they prove well founded, the result may be alike beneficial to the Army and to Jamaica, a Colony in which I feel an interest from the fact that it forms a part of the Empire.

Jamaican Horses and Mules.

Jamaica, being a mountainous country, is admirably adapted for horse raising, though not so well for breeding cattle.

There are thousands of grazing farms, called "pens," on which horses, mules, and asses are bred, nearly all of them having what is called *Guinea grass*, on which horses thrive and grow fat. Even the small black and brown landowners raise excellent horses. The census returns give 46,076 as the number of "horsekind," which includes mules (probably one fourth of that number).

I resided nineteen months in Jamaica, and principally in the parish of St. Elizabeth, the great horse-breeding district, the census returns of which give 6,231 as the number of horsekind. The fact that there are only 137 four-wheeled, and 276 two-wheeled vehicles (including drays, carts, &c.), shows how many of the horses are only used for riding. Many, too, to avoid the road tax, are left unbroken.

Formerly larger horses were bred in Jamaica than is now the case. Most of the horses are about 14 hands high. Great care has been taken as to breeding, and nearly every horse is partly thoroughbred.

They seldom get corn, and make long journeys on Guinea grass; though, of course, prolonged work would necessitate a supply of corn.

As both horses and mules are handled from the time they are colts on account of the ticks, and grow up as docile as dogs, there is no trouble about breaking them. Horses that never had a collar on them are put into buggies with broken horses, and driven on journeys, even on dangerous mountain roads.

I have seen, on market days, horses waiting patiently for their masters, without being tied, the reins being simply slipped over the saddle and under the stirrups. They do not run away, or fight with each other, nor have I ever seen a biting or kicking horse, unless he was a stallion. They are nearly all used to the saddle, are good roadsters, being especially fast walkers, and are generally trained to canter; and would, in a warm climate, thrive where English horses would starve and break down.

The existence of a cheap supply in Jamaica of excellent mules, both for draft and the saddle, will be found to justify my having drawn the attention of the War Office to that island in October, even if the horses should prove to be too small, or too few to be of use.

Price.

Jamaica supplies the West Indies with horses, but the demand is not enough for the supply. Every "penkeeper" has a score or two

of horses "eating their heads off," an inexpensive process, for pasturing is abundant and cheap. I was offered, in the Santa Cruz mountains, a fairly furnished house, on a beautiful site overlooking 40 miles of savannahs, 2,000 feet below, a supply of three quarts of milk a day, and pasturage for three horses, for 5*l.* a month. Men's wages in the horse-breeding district are about 3*s.* 6*d.* to 4*s.* per week, servants finding themselves.

Hence horses can be raised, fed, and cared for, at an almost nominal cost.

The climate, too, is admirably adapted to horse-raising. It would seem that a tropical country was the original home of the horse, for the horses sent down from the mountains (2,000 feet high) to the plains or savannahs, flourish there, and improve in condition. I bought for 13*l.* 10*s.*, from a brown man, one of the most perfect cobs I ever owned, as respects colour, shape, breeding, temper, and action.

Good horses, from 13½ to 14½ hands high, can be bought for from 12*l.* to 20*l.* Superior horses bring larger prices. 30*l.* is a fancy price. Mules sell for from 15*l.* to 20*l.*

To show how unprofitable is now the business of "penkeeping," and how little is the demand for "horsekind," I may mention an incident within my own knowledge.

A Jamaican, who owned an extensive pen, on which there were a score or two of "horsekind," was pressed for a comparatively small amount, and was about to sacrifice a valuable horse and some mules. A friend of his offered him the amount for three months, so as to give him time to realize by selling some of his "horsekind." Months passed, and he could not get anyone to buy anything; and at last it ended in his sending some horses to Kingston, which were sold for a very small price. This state of things prevails generally among the penkeepers, who find it almost impossible to sell any horsekind, except now and then some mules. If there were inducements, the supply of horses could be doubled in a very short time; and if larger horses were needed, a little care would enable them to meet the demand.

Geographical Advantages of Jamaica Unique.

What is required is a suitable breeding-place, not accessible to foreigners or outside dealers, and where there is but little local demand for horses. This is exceptionally the advantage of Jamaica. In Barbados and Demerara there is a demand for Jamaican horses, which is limited, and can never become large, while Cuba raises its own horses, which are "pacers," no other saddle-horses being sought for there.

The cost and risk of exporting horses to the United States will prevent Jamaican breeders from competing with the owners of ranches in Texas, the Western States, and the North-West of Canada.[1]

Hence, if a large number of superior horses are bred in Jamaica,

[1] The paragraph relating to the supply of horses from Canada has been withdrawn by the author as not coming within the scope of this paper.—Ed.

they will always be obtainable at as low a price as now prevails, and the chances are in favour of even a diminution of price. A fixed and permanent scale should be adopted, so that the Jamaicans may not be discouraged by the possibility of a superabundance of good horses as the result of the proposed measures.

It should, however, be decided that in event of war being expected, an Order in Council may be issued prohibiting the export of all horse-kind. This would prevent foreigners on the eve of a war from depleting the island, and would ensure an ample supply, when needed, not only of cavalry horses, but also of other horsekind, such as are needed for transport, &c.

The enormous advantage that it would be to the horse-breeders of Jamaica to be able to reply on a *steady demand* by the Government for *all* the horses they can register for cavalry purposes, would be a sufficient inducement for them to protect the British Government from outside competition.

It is not probable that Jamaica can ever supply the largest class of horses, such as are required for the Life Guards, for there is a tendency in them to become light, active animals, like Arabs, which, however, could be guarded against by careful breeding, and by the regular supply of cavalry mares sold for breeding purposes to Jamaican penkeepers.

In order to encourage penkeepers to breed cavalry horses, the Government should undertake that all horses suitable for cavalry, raised in or imported into Jamaica during a fixed period (say the next fifteen years), shall be entitled to be registered in their proper class. The age which should be the limit, beyond which horses should not be registered, would of course be a matter to be decided by the Government.

It would also tend to ensure the hearty co-operation of the penkeepers and of the people of Jamaica, if commissions should be offered, in event of war, to those penkeepers or their sons, and other gentlemen, who may have duly qualified themselves for active cavalry service. Lord Wolseley knows how useful the Canadian militia cavalry were during the Fenian raid, and all the cavalry Officers of Europe are aware that the Emperor of Russia's prize for the best essay on "Modern Cavalry and its Organization" was carried off by a Canadian militia cavalry Officer, Lieut.-Colonel Dennison. The young Jamaicans are often very fine men, accustomed to a tropical climate and its dangers, and able to stand exposures that would break the constitution of natives of the north.

Five-sixths at least of our campaigns are in tropical and semi-tropical countries, where the hot sun, bad water, and the deadly night air are more fatal than the arms of the enemy. With these dangers both the men and horses of Jamaica are admirably adapted to cope.

The Necessity for a Reserve of Horses for the Army.

It is admitted that we are certain, in the event of war breaking out, to be unable to supply the number of horses that would be necessary,

for even our present limited sources of supply would, to a large extent, be cut off in event of a general European war. Is this always to be the case? If so, our Army, numerically insignificant compared with the vast hosts, thoroughly trained and equipped, that Continental nations have ready for immediate use, would be still further weakened by our not being able to make it efficient as respects horses; and the outlook would, therefore, be a very serious one.

A sobriquet, "The Unready," is probably all that we know of the worthy to whom it was applied. Possibly, he may have ultimately been a military success, when wars lasted for generations. But now a "Thirty Years' War" becomes a thirty days' war; and the nation that is content to play the *rôle* of "The Unready" is a nation that is content to be conquered. Though few persons can deliberately think of such a contingency, yet, when called on to choose between saving money and saving the Empire, there are too many who theoretically prefer the last, and practically devote their attention to the first alternative. To this class the scheme I submit will be attractive, as it has the redeeming quality of being a very cheap one.

Though by neglecting to have a system of registration we might save the registration fees, it would prove, in the long run, to be "a penny wise and pound foolish" policy in more respects than one, for, even as regards the purchase of horses when needed, it must be remembered, that, though in time of peace the owner of a horse would readily agree to have a moderate price put on his horse, he would not in time of war be so moderate in his views; and the greater the urgency of the demand or the scarcity of the supply would be, the higher would be the sum asked for the horse. If a war were to break out, and some thousands of the ordinary Jamaican horses should be required, animals that would now be sold readily for 12*l.* could not be had under 20*l.* Nor is this the only penalty we should pay for our unwise economy, for in point of quality and efficiency the horses bought on a short notice, and in a great hurry, would be much inferior, as a whole, to those that had been carefully examined, and selected for the purpose of registration.

Another serious result as respects *delay* would be the consequence of such a policy. A bargain would have to be struck for each horse, which would have to be examined and tried; and weeks, and perhaps months, would elapse, ere the proper number could be secured. Even this would be only the beginning of the delay, for the horses would require to be broken and trained to be of any practical use, and this would take months; while a registered reserve of horses, sufficiently broken and drilled, could, on receipt of a cable message that it would be needed, be collected, and ready for shipment to the seat of war, by the time that the transport sent for them could reach Jamaica.

Jamaican Horses suitable for a Reserve.

The objection in Germany to registering horses for a reserve, that they become deteriorated in a short time from hard work, and when wanted are generally useless, does not apply to Jamaican horses,

which are rarely used for mail-coaches or for heavy draught, either on roads or on the estates, mules being employed for these purposes. Most of the horses in the island are required only for the saddle, or for light vehicles, buggies being largely in use. Hence it is a rare thing (out of Kingston) to see a lame horse. Should a horse be registered, and the owner entitled to receive 2*l.* 10*s.* or 5*l.* per annum, so long as it is sound, the fee would be of sufficient moment to him to make him take good care that his horse should not, through having been overworked, be struck off the register.

It is very desirable that if horses are bred in Jamaica for the use of the Army, they should be kept as *a reserve;* and that only those that are in excess of the number fixed for the reserve should be used to supply the ordinary demands of the cavalry, for nowhere else can a reserve be so cheaply kept, unless in large droves on prairies, where the longer the horses remain, the wilder they become, and the more time and training they require to render them fit for use.

In event of a European war our campaigns will probably be on the shores of the Mediterranean, either in North Africa, Syria, or Turkey, where these horses, accustomed to a tropical climate, would be most serviceable and enduring. But it would be a bad policy, as well as a costly one, to take them to England for six months or a year, before sending them for service to a warm climate, as they would be seriously deteriorated by the attempt to acclimatize them temporarily in England.

Hence a reserve of such horses should be sufficiently trained to be fit to be sent direct to the seat of war.

Reserve of Horses for Mounted Infantry.

When I first outlined a scheme for utilizing Jamaica for the purpose of supplying horses for the Army, I was not aware that of late the value of mounted infantry has been attracting much attention. On reading Major Hutton's valuable paper on the subject, it became apparent that the present breed of horses in Jamaica is admirably suited for the purpose, as they are surefooted, hardy, and docile animals, with easy paces, and can get over a surprising amount of ground in a day, on very scanty fare, and under a tropical sun.

The price of such horses varies from 12*l.* to 16*l.*, and sometimes 20*l.*; 15*l.* would be a very fair average.

Incredible as it may seem, it is estimated that a registration fee of 2*l.* 10*s.* per annum would be a sufficient inducement in Jamaica, to breed and keep horses about fourteen hands high for the use of the Government. Mr. R. H. Jackson, who is well acquainted with the valuation of estates and stock there, says that it is customary, in buying or lending money on an estate, to value each head of horned stock on it as worth 1*l.* per head per annum. Where there is exceptionally good management, it may be increased to 30*s.* He, therefore, calculates that, could a penkeeper count on 2*l.* 10*s.* per annum for registering each horse of fourteen hands and upwards, if sound and suitable, it

would pay him to get rid of his horned stock, and to breed and keep horses in their place for the sake of the registration fee.

It might be made a condition, that at the end of the first year of registration, each horse shall have been broken and drilled for the use of mounted infantry, facilities for that purpose being afforded by the Government.

The following is an approximate estimate of cost of registration of a reserve of 5,000 horses at 2*l.* 10*s.* per annum each, for six years.

Horses.	Per annum.	Six years.
5,000 at 2*l.* 10*s.*	= 12,500*l.*	= 75,000*l.*

A Future Reserve of Cavalry Horses in Jamaica.

The report from Jamaica on this subject now at the War Office, which I greatly regret I have not had the advantage of consulting in preparing this paper, will no doubt bear out my impression, that the Jamaican horses generally do not exceed fourteen hands high, and that few of them reach fifteen hands, for a pair of carriage horses which I used in Jamaica, though only 15.2, were thought unusually large, wherever I went. Smaller horses are better suited to the work required of them, and the climate tends in time to make them small; but if a demand for a larger type were created, it could be supplied to any extent in time, the only limit of supply being the measure of encouragement which the Government is willing to hold out to the penkeepers.

As the supply has yet to be created, and the Government has yet to be induced to encourage it, it may seem somewhat premature, according to a familiar adage, to count your horses before they are foaled; but, if the matter of horse-breeding in Jamaica is taken up by the Government, it may be wise at the outset to let penkeepers know what will be wanted, and what they may expect.

A certain market for all the horses of the stamp required, or a small annual subsidy, in the form of a registration fee, would make horse-breeding for the army a very extensive business in Jamaica, for in addition to the large area at present covered with pens, sugar estates are steadily ceasing to be cultivated, and are being converted into grazing farms. So that in time Jamaica might be able to supply a reserve of horses and mules for the army, excepting, perhaps, horses for the Household Troops or for the artillery, which could be, no doubt, elsewhere more easily bred.

For the stamp of horses required for cavalry, 25*l.*, I believe, would, as an average, be a very remunerative price, and an annual registration fee of 5*l.* would suffice; if not, one of 10*l.* would be ample, for what has been said by me as to the low cost of keeping the ordinary Jamaican horses, will to a large extent apply to animals that may be specially bred for the army.

It must be remembered that we have to consider, not only the distressed Jamaican penkeepers, but also a very different class, the Parliamentary economist, and that long-suffering individual, whom

he takes under his protection, the British taxpayer. To satisfy them an abatement of one-fifth of the price of registered horses might be made after five years, a proposal that is not unfair to the Jamaican horse-breeder.

It will be also a consolation to the British taxpayer to reflect that under the registration system, the penkeeper has to supply the capital. He has to keep up his pen, and the buildings on it, pay wages, buy mares, defray all the expenses connected with breeding and rearing horses, forage, shoeing, &c., and run the risk of all accidents and contingencies. If his mare or her foal dies, he must bear the loss. If the horse registered becomes unsound, it is struck off the register, and he alone is the loser. The Government, in fact, incurs no risks. It pays for *results* only.

To the economist a comparison of the cost of 5,000 horses bought and kept in England for six or nine years, with the cost of the same number registered in Jamaica for the same periods, may be of interest and may even be somewhat startling.

Approximate Estimate of Cost of 5,000 Cavalry Horses bought and kept in England for Six to Nine Years.

	For one year.	For six years.	For nine years.
	£	£	£
5,000 horses, price at 40*l.*	200,000	200,000	200,000
Forage at 23*l.*	115,000	690,000	1,035,000
Add—			
Loss by death 3 per cent. per annum (say 150 horses at 40*l.*)[1]	6,000	36,000	54,000
Cast horses, 10 per cent. per annum (say 500 horses at 40*l.*) ..... 20,000*l.*			
Cast horses sold (500 at 10*l.* 10*s.*) ..... 5,250*l.*			
	14,750	88,500	132,750
Interest on 200,000 at 4 per cent. per annum	8,000	48,000	72,000
	343,750	1,062,500	1,493,750

In round numbers the cost for nine years would be one million and a half.

Compared with this, the cost of registering 5,000 horses for six or nine years, at 10*l.* per annum, would be as follows:—

Horses.	One year.	Six years.	Nine years.
5,000	50,000*l.*	300,000*l.*	450,000*l.*

[1] In preparing this table, I have been much indebted to the valuable Report of the Principal Veterinary Surgeon to the Forces dated March 18, 1886.

Should the horses have to be purchased, the price would be 125,000*l.*, or, after five years, 100,000*l.*

Hence the registration system would, at the end of nine years, effect a saving of over three-quarters of a million of pounds, even after reserving a balance of one-quarter of a million to meet the outlay required for carrying out the system, the cost of breaking and training horses sufficiently to fit them for shipment to the seat of war, should they be needed, and whatever other expenses might be necessary, a result that could not fail to be highly satisfactory to the British taxpayer.

Encouragement of Horse-breeding.

The system pursued on the Continent, of the Government supplying stallions for the use of horse-breeders, the charge per mare being very low, would be well adapted to Jamaica. Cast cavalry mares should be sent out to Jamaica and sold to penkeepers, the money being loaned to them at 4 per cent., secured as a first charge on the property of the penkeeper. As the mares would not yield any return until the end of five years, it might be considered proper to allow the amount loaned to bear no interest during that time. Money is so scarce in Jamaica, that loans cannot be effected, except at a very high rate, reaching 10 per cent., and to relieve the landowners from this pressure, an agitation has been carried on for the establishment of agricultural banks. Mares exported from England would, under the proposed arrangement, meet with a ready sale, and realize a good price. For this suggestion as to an advance by Government at a moderate rate of interest, I am indebted to the Custos of Manchester, one of the principal horse-breeding districts.

The Establishment of Government Pens.

Should the Government take steps to utilize Jamaica as a source of supply of horses for the Army, years must elapse before the system could be developed; and in the meantime the preliminary expenses ought to be very moderate. It might be desirable at the outset to rent a few small pens, with suitable buildings, where a small staff of cavalry pensioners, veterinary surgeons, &c., could be accommodated, and where the stallions sent by the Government could be kept. Such pens could be had at a rent of from 200*l.* to 300*l.* per annum. In time, it might be found necessary to rent more extensive and expensive pens, on which, in event of the reserve being required for active service, the horses could be prepared by being fed on corn, and by proper training, for being sent in a serviceable state to their destination. To avoid the necessity for renting very extensive properties, that would only be needed in case of emergency, arrangements could easily be made with the owners of adjoining pens for the use of Guinea grass on them, should it be required.

In Germany, Austria, Hungary, Russia, and Italy, remount depôts have been found to work well—a subject to which I need not further refer, as it has been already fully and ably discussed by Colonel

Russell. For the purpose of training the reserves on the Government pens, it might be desirable to utilize the black soldiers of the West India regiments. Those from Jamaica are nearly all good riders, and accustomed to the care of horses and mules; and it might be a subject worthy of consideration, whether it might not be wise to increase the strength of these regiments, so that some hundreds of disciplined black soldiers, suited for scouts, mounted infantry, and the charge of mules, and for work in a hot climate to which Englishmen are ill-adapted, could be sent with Jamaican horses, if they should be needed in a campaign in a warm climate, such as that of Egypt or Syria.

I may add in conclusion that in drawing attention to the capabilities of Jamaica, I should not be supposed to be desirous of interfering in any way with the development of the horse-breeding resources of Canada, the Cape, and other Colonies, for whatever encouragement may be given to them, a large Colonial supply is a thing of the future; and it will be many years before the Colonies will be able to contribute more than a small proportion of the enormous number of horses that will be needed in event of our taking part in a general, and above all (if such a thing is a possibility in modern warfare) a *protracted* European war.

I may add that I have no interest in this question whatever, excepting that which every loyal citizen feels upon matters affecting the Empire. A native of Canada, I was connected with that country for many years, and therefore when I speak of Jamaica, a country with which I am in no way connected, I am simply looking at our Imperial interests, not as an English colonist, but as a Colonial Englishman.

The CHAIRMAN: Before inviting discussion upon the interesting paper we have heard read, I will initiate it, so to speak, by reading to you a letter and paper which have been put into my hands, received by your Secretary from Colonel Ravenhill, who is unavoidably absent.

The letter forwarding the following remarks, which the writer requested might be read at the meeting, and expressing his regret at his unavoidable absence, was then read.

A SUPPLY OF CAVALRY HORSES AND THE ESTABLISHMENT OF A CAVALRY DEPÔT IN JAMAICA.

I HAVE not had the advantage of seeing the paper about to be read at the Royal United Service Institution on Friday, 4th March, 1887, but I offer the following remarks on the original paper as submitted to me some time since.

Some of the deductions set forth in this are incorrect, as we find at home sufficient horses for our cavalry in times of peace; it is in case of an emergency where the ordinary supply fails.

The cost of purchasing in England and Ireland, as stated, is certainly not so great as it would be if buyers were sent abroad.

Independent of French Canadian and Normandy horses, there are some well-bred animals in Canada, wintered without difficulty in the rough, and I am of opinion that a great future is before the Canadian N.W. in the matter of excellent horses, which reproduce themselves with good results, of good sizes, breeding, colour, easily accessible, and at moderate prices; the climate and grasses being suitable.

With regard to the suitability or otherwise of the climate of Jamaica, Darwin, at page 52, vol. 1 of his "History of Animal Adaptation," says, "There can be no doubt that horses become greatly reduced in size and altered in appearance by living on mountains and in islands." And again, "Horses can flourish under intense heat as well as intense cold, but much humidity is apparently more injurious than either heat or cold." He then mentions "the Falkland Islands, where horses suffer much from the dampness."

I wonder if he ever thought of Jamaica, within the tropics, within the influence of the Gulf Stream, in a humid atmosphere, injurious to the proper development of the horse.

I hold letters from a gentleman, an agent in England of a considerable property in Jamaica; he says, "The breeding of mules is a more ready source of profit than that of horses," which is also urged on page 3 of this paper; thereby refuting and answering its own argument, and my friend adds, "Where the horse fetches 10*l.* a mule fetches from 20*l.* to 25*l.*"

I am informed further, "that Clydesdale stallions have been imported into Jamaica, and, not being able to stand the heat, have died within the year."

I learn that the British Officers who lately visited the horse "pens" in Jamaica found the mares very light and weedy, and unfit for British cavalry; the production of their report would be interesting; it is at the War Office.

Another gentleman who has property out in Jamaica, writes to me:—"I am not aware whether or no the weediness of the mares comes from climate and food conditions; but we have always pursued the practice of putting a T. B. English stallion to these mares for the ultimate purpose of putting the produce, when fillies, to donkey stallions for mule breeding."

This man further tells me, "If they did not continuously import fresh blood to keep up their breed of mares for mule breeding, these would deteriorate to such an extent as to be useless for that purpose." How can such a place be fitted for breeding English cavalry troop-horses?

With the experience and results of the Government studs in the East Indies before us, which had to be abandoned, having deteriorated from being located in an unsuitable soil and climate, would it be desirable for the British Government to establish a horse-breeding depôt in such a situation as Jamaica?

In the existing state of agriculture in this country would it not be preferable to take up suitable lands here and establish depôts, which would have the additional advantage of being on this side of the Atlantic?

I regret that absence on duty purchasing horses in Ireland for the Government prevents my personal attendance at the lecture.

F. G. RAVENHILL, Colonel, R.A.,
Inspector and Purchaser of R.A. Horses.

R.A. Remount Establishment, Woolwich,
March 2nd, 1887.

Such are Colonel Ravenhill's remarks upon a paper which he had not seen, although he had received one of similar character. We naturally must regret the absence of Colonel Ravenhill to-day, but I think I am right in believing that his able colleague who was connected with him in the recent Canadian Commission, viz., Colonel George Philips, is present, and I am sure he will favour us with his knowledge and experience. I may say on behalf of Colonel Haliburton, that I am sure the paper which has now been read is not in any way intended to be depreciatory of Canada, but that the idea is that Jamaica may be looked upon as a place from which we may draw horses for remounting a portion of the Army.

General Sir HENRY NORMAN, K.C.B., C.I.E., &c.: Colonel Milne Home and gentlemen, as Governor of Jamaica it seemed to me desirable that I should attend this meeting, though I have done so with very considerable difficulty, as I have very little time at my disposal. I am sure that on behalf of the Colony of Jamaica I ought to thank Colonel Haliburton for the trouble he has taken in bringing this subject before the public, and I think those Englishmen who desire to see the resources of the Empire developed for military purposes will thank him also. I have no doubt whatever that, notwithstanding what my old friend Colonel Ravenhill may say, Jamaica is a very good country for breeding horses. It produces, and has produced for nearly two centuries, a very excellent description of horse, which is cheap, hardy, and I think tolerably long-lived. The Guinea grass that prevails affords cheap pasturage, and on the whole I suspect there are very few places, certainly none in a tropical climate, where horses can be so well and so cheaply bred. It is quite true that there has been no demand for very large horses in the island, but I think it is a mistake to suppose that there are not a great many horses 15 hands high. Certainly there are a great many much bigger horses than those used in India in my early days. The subject having been brought to the notice of the War Department, the Officer commanding in the West Indies was directed to inquire into the capabilities of Jamaica as a place for the supply of horses, and in order to assist him in carrying out those inquiries I placed at his disposal my Adjutant, a horse artilleryman, thoroughly well acquainted with everything connected with horses, and also a gentleman in the Government employ well versed in horses. Both those gentlemen take the greatest interest in Jamaica, and they devoted themselves to their task by individually visiting the breeding pens and by giving out notices inducing the peasantry to bring in their horses, and in that way a very large number of these horses were brought into the very village to which Colonel Haliburton alluded for their inspection. The number of horses in Jamaica, I suppose, is larger as compared with the population than that of any other country in the world. Nearly everybody owns a horse, and that large and greatly increasing class of the loyal peasant proprietors nearly all own horses and constantly ride to market. The report of these gentlemen, which I have seen, but which is as yet an official document, bears out very much what I have said. There are a vast number of very good horses, but they would not come up to the standard now required for British cavalry, though I believe a large number of them are suited for the purposes of the mounted infantry, and with a certain amount of encouragement it would be quite possible to breed a much larger description of horses at a cheap rate. I never heard of there being any considerable mortality amongst the stallions constantly imported from England. They may die on particular estates. Perhaps they do not come out very young, but still I think they have an average duration of life. It would be desirable that some mares should be imported if the larger kind of horses is to be required. I do not follow the

lecturer in desiring to see any attempt made to promise commissions to gentlemen who breed horses for the Army in the event of war, or to form Government studs. I agree that Government studs were rather a failure. I should simply like to see either a fixed supply laid down to be furnished by the island, or that the Government should, under a system of registration, ensure that there should be a constant reserve there. I am quite sure now in the event of war if I were to be asked to furnish 500 or 600 horses perfectly suited for mounted infantry, I should be able to get them at a reasonable price, and the number of mules available for transport purposes is very considerable indeed. Excellent mules to-day do fetch in Jamaica itself very large prices; they are in great demand for tramcar companies and on various estates. That is all that I should hope the War Office might take into consideration, and I would not complicate it by having Government studs or promising commissions to pen-keepers. We have proved practically that the horses are fit for mounted infantry, because under a very excellent local law I have, through the loyalty of the people, been able to form a corps of volunteers for the militia, who while they serve are subject to all the penalties and rules affecting the militia. Of course the mounted proportion of it is small—two companies of mounted rifles—but the mounted rifles have been able to take part in a very considerable field-day which lasted fourteen hours—the attack and defence of a house; the whole scheme having been devised by the Brigade-Major, and he reported to me that nothing could be better than the way in which they scouted; the men being principally clerks in offices or assistants in shops. They did me the honour of insisting on escorting me to the wharf the other day, when I came from Jamaica, and they turned out in a very creditable way, and formed an escort which very much bigger persons than myself need not have been ashamed of. In that way I think we are doing something; and should Her Majesty's Government really wish to encourage horse-breeding in Jamaica, I think they can do so at no very great outlay or expense. I am sure Colonel Haliburton's paper will be received with interest by the public. It is true it has only treated on the horse resources of one Colony of the British Empire, and that comes sixth or seventh in point of proportion, but it is very suggestive of the fact that the Colonies of the British Empire, instead of being an incubus on the country, do possess in themselves enormous resources, which would be placed at the disposal of the Imperial Government by the loyal subjects of these Colonies in the event of a great war, and I think they also impress upon us the expediency of the central authorities keeping themselves thoroughly informed as to the extent of all the military resources of the Colonies of the British Empire.

Colonel GEORGE PHILIPS: I feel bound to get up, being called on by Colonel Home to make a few remarks as regards horse-breeding. In the first place, the size of the horses in Jamaica is at least a hand under what would be of any use for our cavalry or artillery. Horses 14.2 would for the English cavalry or artillery be utterly useless, for the simple reason that when you met other regiments they would just ride you down like grass for want of weight. As regards the breeding of big horses in a climate that is mountainous and tropical, naturalists will tell you that even if you imported large horses, in a very few generations they would dwindle back to the animal indigenous to the soil. With regard to the horses in Canada, where I went last summer in conjunction with Colonel Ravenhill, after travelling many thousand miles and seeing a vast number of horses, we rejected an immense number for that very reason, that they did not come to the standard measurement. I am quite certain we could have bought hundreds of horses if we had taken 14.2, and we never thought of looking at that height. If we had taken 15 or 15.1, we could have bought a great number, but we took nothing under the standard 15.2, for the reason that in the cavalry and artillery we have that as our standard, and I think it is the minimum standard that would meet the requirement of the Service. Of course I am not now discussing mounted infantry; no doubt the smaller and hardier the ponies, the better they go along and the easier they are for the men to manage. As regards remounts for our cavalry and artillery, I believe on the eastern slopes of the Rockies in a very few years there will be as fine a breed of horses as we have now in Australia. They have an excellent climate, they have a magnificent water-shed, which so many of the ranches in America and Texas suffer from the want of, and they have magnificent grasses for

the horses to feed on. Some of the ranche owners at this present moment are going into this business. I know of one gentleman, Mr. Cochrane, who has a thousand picked mares on his ranche, and he is going in for breeding horses for the English cavalry and artillery; he has already made a very great name for himself as a short-horn breeder. I have not the least doubt that in three or four years, if Officers visit his ranche, they will be able to pick up some thousands of horses suitable for our cavalry and horse artillery. The great difficulty we found there was finding saddle horses. Very few people in Canada ride, in fact, in Canada proper there is hardly any riding at all. Nearly every one drives, and consequently where most attention is given to draught horses there is naturally a want of riding shoulders, which is a most essential thing for cavalry horses. I think in the future the eastern slopes of the Rockies, even without much encouragement from Government, except that they would say they would go out to purchase every year there, would be able to supply us with thousands of horses. Land is let there at a merely nominal rental—two cents an acre for a twenty-one years' lease. Magnificent mares can be brought from Montana and Oregon, all of English blood—English sires have been out there over a century, running from 15 to 16 hands high, and that is the class of horse we are looking for to supply our cavalry and artillery and to carry our troopers in time of war, and nothing under that height, when it came to the shock of the charge, would be any good at all; in fact, you would be simply ridden down as our light cavalry were at Waterloo by the Cuirassiers, who were again in turn ridden down when they met our Life Guards and Blues.

Lieutenant-Colonel E. GRATTAN, A.C.G., Commissariat and Transport Staff: I wish to make a few remarks because I have recently served in Jamaica, and in 1884 in my Annual Report I drew the attention of the authorities to the rare advantages that island possessed for breeding horses and cattle. Disease in an epidemic form is entirely unknown in Jamaica amongst horses and cattle, and the greatest number of casualties are due to accidents. I never traced but one case of true glanders there, and the two or three cases of farcy I followed up were fully accounted for by the abominable places in which the animals had been standing. As far as the climate is concerned, I am perfectly certain we could breed any class of horse in Jamaica—I had horses myself up to 15.3½, and I have seen others over 16 hands. The fact is, however, that with the depression in sugar, Jamaica has very little means of importing proper stallions, and there has been an utter neglect of all true principles of breeding, with the result that nearly all the horses are defective in conformation—straight shoulders and pasterns, narrow chests, slack loins, &c., being common characteristics. With regard to registration the negro is a very bad horse master. I have never known grooms who treat horses so badly as the negroes in Jamaica do. Their treatment is simply brutal, and for that reason I think the benefits of registration would be very doubtful, because when you come to get horses six, seven, or eight years of age, you would find them battered to pieces, and very few would have legs to go upon. With regard to the estimate made by the author, I do not think the paper has given credit for the value of the English horses remaining at the end of the nine years, and the value of their services during the nine years should also be taken into account. I think, therefore, that a proper estimate would show that while the English horses would be doing good work for their country, the Jamaican horses would be working for their owners, to whom John Bull would at the same time be paying large sums, for the doubtful advantage of being able to purchase them at full market rate, should he ever desire to do so. So far as my observation went, the recommendation I would make in the matter of Jamaican horses would be that the Jamaica Government should import a few good stallions and let them serve mares of a specified standard at a nominal fee; by keeping up the importation of stallions the breed would be gradually improved, and if pressure could be brought to bear upon the West India Mail Company, who charge exorbitant prices for exporting animals to other islands, to lower their tariff, I think the Jamaica people themselves would get up the trade very well, and they would have little reason to regret the decline of the sugar industry. I believe large fortunes are to be made out of horses and cattle in Jamaica, and I wish I

could get up a Company for the purpose, for I am convinced that all it wants in order to do it is capital and enterprise.[1]

Colonel KINGSCOTE: When I saw the subject of this paper announced I came here with some curiosity to learn whether Jamaica could supply horses that were suitable for cavalry or artillery purposes. I own that I was very sceptical whether Jamaica could be proved to be of advantage to us for that purpose, and I am bound to confess having heard the paper I am still as sceptical as I was when I came here. I cannot for one moment think it would be a right plan to subsidize animals of the kind talked about, even if they grow to the height of 15.2, when they are so far off as Jamaica. The whole thing is this: that you are to spend a lot of money to subsidize animals which are some thousands of miles away from this country, that you are only to use them on an emergency, and that emergency when you want animals very quickly. It strikes me the money could be spent very much better at home, or at all events at some of our nearer Colonies. Nothing would give me greater pleasure than to forward any scheme of this sort to help any of our Colonial possessions or Colonies, but it must not be at the expense of the mother country. Of course I have had no experience of Jamaica, but I have made it a point since I saw the announcement of this paper to ask a friend of mine who has property in Jamaica what he thought about it. I know he is a very large mule-breeder. He told me that the great difficulty was to keep up the size of the mares from which the mules came, they deteriorate so very quickly, and unless he imported fresh mares every now and then from England he had no chance whatever. Therefore, although you may make it a mule-breeding country I do not think you can breed animals there that will carry our cavalry soldiers. I am certain, as has been said by other gentlemen here, that as it was in the origin so it will come again. I believe whatever pains you take in sending out stallions you will not be able to keep up the breed to a sufficient size to mount our cavalry. As I said before, at the great disadvantage of being miles away you are going to pay a large sum of money to subsidize these horses, which I venture to think would be far better spent in some such way in England, and I do not believe anybody would gain any advantage by it whatever except the pen-keeper in Jamaica. I am sorry to throw cold water upon the scheme so ably put before us, but that is my honest opinion, and I cannot help thinking it will be the opinion of the very large majority of the English people.

The CHAIRMAN: I am informed that Mr. Jackson is present, a pen-keeper in Jamaica, and I am sure some remarks from him would be valuable.

Mr. JACKSON: I would have preferred to remain silent, but perhaps I can throw light upon something that dropped from the last speaker, namely, with regard to the degeneration of mares. If the gentleman who gave that opinion had any practical knowledge of mule-breeding he would have known that the mere breeding of mules exhausts mares, and will of itself account for the fact that they die out,

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[1] I regret that I omitted to mention the Jamaican mules. The mules used by the Kingston Tramway Company were, without exception, the best class of transport animal I had ever seen. They are about 14.2 or 3 in height, of great substance, very different, on the one hand, from the overgrown brutes of 16 or 17 hands, that on service are hardly able to carry their own harness, on a pinch, and on the other hand, from the well-bred weeds, whose legs break down with moderately heavy draught. A pair of Kingston mules would start from the tram terminus (a few feet above sea level) with a car loaded as full as it could be crammed (weighing nearly 3 tons), and they would trot off with it at the rate of about seven miles an hour, the first two miles of the trip being a very stiff incline. The company purchase none but the best mules, and I believe they pay about 22*l.* a-piece for them. There is not a sufficient supply to meet large export demands, but if it would be as economical to purchase some of the best Jamaica mules as those we now get, I think it would be well to begin by taking a certain number annually. This would encourage breeding, and in time, there is no doubt, we would be able to draw largely on the island, for a class of animal admirably adapted for draught and pack purposes.

and that if they are turned again to account in horse-breeding their offspring are degenerate. There can be no doubt that if a man wants to reduce his mare to the lowest physical condition, the best thing he could do would be to set her to breed mules; hence it is that those planters who breed mules carefully breed horses and mules alternately in order to rest the mares. With regard to the capabilities of the horses I have some knowledge. I have never found any difficulty in finding horses equal to 18 stone, and I take it a thousand horses could always be found in Jamaica, even without any registration fee or any system of registration whatever, equal to that weight. And if encouragement were given to the pen-keepers no doubt that number would be doubled without any difficulty whatever. The value of a horse of that kind would probably be about 30*l*. As regards mules, I would correct an impression which has been occasioned by the remark that mules in Jamaica fetch from 20*l*. to 25*l*.; the average price is about 14*l*., at all events that sum would be nearer the mark than 20*l*. to 25*l*. It is perfectly true the Tramcar Company has paid 20*l*. for mules, but those mules were picked mules; they were some of the largest mules in the country, and were selected from herds carefully bred and of a given size and weight, as they had to drag the heavy cars which run about Kingston on the tram-lines. Now the whole matter seems to me to present itself in this way. Jamaica has admirable resources for the breeding of horses, and horses of 16 hands high can undoubtedly be purchased there. But the terms upon which any bargain or arrangement might be made is one for consideration, and we ought not to lose sight of the fact that Jamaica is distant from England, and the probability is that difficulties of transport might arise. What the value of a horse at a distance of 5,000 miles may be upon an emergency is a question which the authorities of the War Department can settle better than I can. I will not enter into that question, but content myself with saying that the horses are there, and with very little encouragement could be produced year after year, and could be kept as a reserve or supply for immediate use provided some little encouragement were thrown out to the pen-keepers in Jamaica. The island possesses very large resources with regard to grass and climate. I have in my mind's eye at this moment at least half a dozen thoroughbred stallions imported from England, all of which are doing well in Jamaica. I have not heard of the death of an English sire for some years past. No doubt some sires may have died from some cause or another, perhaps from injuries received on the voyage or some other cause or causes. But I do not think that any such death can be set down to climatic influence; there is plenty of grass, a good climate, and a number of persons willing to import good sires provided some kind of inducement could be offered. Whether it is worth the while of the authorities to offer an inducement to the Jamaica pen-keeper will be determined by them, but that good horses can be produced in Jamaica, I think, is beyond dispute, and at a very cheap rate. Horses of and under say 16 hands high could always be got in Jamaica at from 30*l*. to 35*l*., and a goodly number of them.[1]

Colonel Hon. R. TALBOT, C.B., 1st Life Guards: I rise with some diffidence to make a few remarks after the very able and exhaustive speeches that have preceded me; but as I have been called upon to give my experience I cannot refuse, especially taking as I do, being a Jamaica proprietor, a very great interest in everything that concerns the welfare of that island. Now if I were to criticize the speeches that have gone before I think they have gone on both sides a little too far. I think Colonel Kingscote and Colonel Philips were rather sweeping in their remarks about the disadvantages of Jamaica as a horse-breeding country. There is no doubt in the world that Jamaica is a country eminently suited for the breeding of horses. There is a very good class of horses in the country, well bred useful animals. As for the idea that horses are not long lived there, that is as great a fallacy, as I

[1] I desire to add, with regard to the suggestion of inadequacy in size of Jamaica horses, that the horse-breeders in that island have hitherto confined their attention and efforts chiefly, if not altogether, to the production of racing stock, and their importation of sires has been limited accordingly. There is, however, every reason to suppose that with a sufficient inducement to breed heavier horses, they would turn their attention to the importation of hunters and other weight-carrying stock.

know in my own experience. The horses attain to very great ages, and I have never heard of an undue mortality, in fact a great many diseases amongst horses that occur in other countries are absent in Jamaica. On the other hand, I think our lecturer has taken an unduly sanguine view of the capabilities of the island for producing remounts for the Army; I do not think the class of horse exists at present (although I am far from being sceptical as to the possibility of producing that class of horse), and I think there are not enough horses in Jamaica suited for carrying even our lightest description of cavalry. I doubt very much whether Jamaica could ever compete with Canada or this country, but I do think it is suited for the class of horses required for mounted infantry. As has been said, Jamaica horses are sound and active, and those are necessary qualifications for the purposes for mounted infantry. A very large number of these ponies are available, and I think if the lecturer has nothing else to be thanked for he is very much to be thanked for having called our attention to that source of supply for what in the next war in which we may be engaged will be very much required, namely, a large supply of suitable small horses for our mounted infantry. As to the question of mules, I think that also is a very valuable suggestion, that in case of necessity we might draw upon Jamaica for mules, but as has been so well said by Sir Henry Norman, if you suddenly create a great demand for mules in Jamaica or anywhere else you must not think that you can get them at a very low price. The last speaker talked about the value of mules averaging 14*l.*; I can only say as a Jamaica proprietor I should be very glad to buy a considerable number from him at that price. I find practically that to get a good mule you have to pay at least 20*l.*, and for a first class animal 25*l.*, and if a large demand suddenly arises no doubt you will have to pay the same price that you do for large mules in America, which is between 30*l.* and 40*l.* If you want the animals you must pay for them, and the suggestion is a valuable one that Jamaica is available for the supply of these useful and necessary animals to carry on war. As to the scheme of registration suggested by the lecturer, I cannot say that I agree with his figures in that matter at all. It seems to me the idea that you are to pay 10*l.* a year for an animal worth say 15*l.* to purchase, is very extravagant, and I should look at the figures as altogether out of the question. If it were a matter of paying a pound or two, it might be possible to practically consider it, but to pay 10*l.* for an animal even if worth 25*l.* would be most extravagant, and I think we could do a great deal better with our money than spend it in that way. At the same time I should be very glad to see some encouragement given either in that form or in an endeavour to induce small pen-keepers to keep their horses available for the necessities of the Government; should war arise there is no doubt time is of enormous value, and to be able to lay our finger at a moment's notice on a certain number of horses and mules would be a very great advantage. I think we have to thank the lecturer for a very interesting lecture. He has broken new ground, he has given us a good many ideas, and although I cannot support his ideas from first to last, I think his paper contains very many suggestions which will be valuable hereafter.

Colonel HALIBURTON: I regret very much that many of the remarks made have been lost to me in consequence of my not being able to hear very well, and therefore I have very little to say with regard to the discussion that has taken place. I may mention that I was not the first (and I hope I shall not be the last) to draw attention to Jamaican horses, for I lately received a letter on the subject from an Officer who was for a long time stationed in Jamaica, and who as being one of the very best judges of Jamaican horses Colonel Justice says would have been employed on this inquiry in Jamaica, had he been there. While in Jamaica he was so impressed with the value of Jamaican horses for light work, that he suggested to the Quartermaster-General of the United States Army to get the American supply for mounted policemen and their light cavalry from Jamaica, and he is very enthusiastic respecting the value of Jamaican horses, so that I am in hopes that a good deal will come out of this inquiry with regard to mounted infantry, and I may also add, with regard to the subject of the supply of mules.[1]

The CHAIRMAN: Before closing this discussion, I am sure you will allow me to

[1] The line of reasoning which leads to the conclusion that Jamaica resembles the Falkland Islands, and, therefore, can only produce ponies, is somewhat hard to

tender to Colonel Haliburton our united thanks for the great trouble he has taken in coming here to-day and reading this lecture to us, and also to those gentlemen who have taken part in the very interesting discussion. I am sure, as Colonel Talbot has just remarked, that much has been thrown out, many suggestions have been made for consideration elsewhere, and we may all hope that it may bear fruit and be of use in the organization of the cavalry and artillery in the future as well as of the infantry.

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follow; but, assuming the facts as they really exist, it may be stated as follows. The Falkland Islands, which are as far from the Equator as Labrador, have an excessively moist and almost Arctic climate. In Jamaica, a tropical island, with every variety of climate as respects temperature, the rainfall is very moderate, and of late years has been so deficient that the people of the horse-breeding districts have been brought to the verge of famine. The horses of the Falkland Islands are miserably stunted. Therefore Jamaican horses must in time degenerate into ponies. That the largest type of English horses can not only live, but also be successfully bred in Jamaica, can best be shown by the following extract from an editorial of the "Falmouth Gazette" (Jamaica) of November 2, 1886, written for its readers only, and referring to matters of local notoriety. "For draught service, whether for transport or artillery, need we do more than call our readers' recollection back to the good old times when" (he here names a dozen famous pens) "produced horses and mules, that for hard road work, and endurance, won the unqualified admiration of strangers? Many years ago there might have been seen in this town heavy draught horses from the Retreat, equal in size, power, and docility to the best of their kind in England. The Barrets of the Retreat in Trelawney, and of Cinnamon Pen in St. James took pride in their splendid studs, and these fine animals were held of as much worth and value as their pampered slaves." Canadian and English horses are natives of the North, and therefore must be depended on for remounts, and for service in England and in other temperate climates. The Jamaican horse can only be useful for a reserve, and can only be used in event of war. As a native of the South, he is especially adapted for campaigns in a hot climate, where, inured to a tropical sun, and unused to a stable or to clothing, he would, on landing, find himself at home, and would for years stand exposure and hard work that would be a serious tax on Northern horses. In point, therefore, of efficiency, and above all, economy, I believe that the establishment of a reserve in Jamaica would prove most satisfactory, not as a substitute for, but as an addition to, our English and Canadian sources of supply.

Friday, March 11, 1887.

REAR-ADMIRAL R. WELLS, Member of Council, in the Chair.

MASTLESS SHIPS OF WAR.

By Captain C. C. P. FITZGERALD, R.N.

HAVING been invited by the Council of this Institution to prepare a paper on the subject of "Mastless Ships of War," I find considerable difficulty in doing so. Not that I have any doubt in my own mind as to the advantage of having the great majority of our fighting ships mastless; but having already written and talked a good deal upon the subject, I am in some danger of repeating myself.

Repetition may, however, in some cases be admissible, and even desirable. The manufacturers of Pears' soap, and a variety of other useful articles, give us practical proof of the value of repetition from a commercial point of view. "It pays," and that is sufficient for them: and although it may not be necessary for us to placard the railway stations with "Mastless Ships of War," yet we may by repeating some well-known arguments, and discussing them in this Institution, give the subject that prominence which some of us think it deserves.

I also feel that I have some excuse for repeating myself, because a paper which I prepared about two years ago entitled, "How can we make the most of our Ships?" (and in which I enlarged considerably upon mastless ships), was for various reasons never read at this Institution, although it was published in the Journal;[1] consequently it was never discussed, and as I feel sure that the object of the Council in asking me to prepare a paper on the subject of "mastless ships of war" is far more with the view of raising a discussion, and of eliciting the practical remarks which we always hear at these discussions, than of listening to any well-worn arguments of mine, I shall crave lenient criticism at the hands of this meeting if I am guilty of repetition.

In making such a proposition as the entire abolition of masts and sails in men-of-war, I must presume that we are looking a little way ahead—a year or two beyond the immediate present; and although I believe it would be advisable to dismast or rather to unrig immediately all our present ironclads, yet the carrying out of the idea in its entirety, that is, throughout the whole Service, would be more applicable to future designs for our cruizers than to the unrigging of our present single-screw corvettes. They don't carry coal enough to unrig them, and it may be even open to question whether we shall

[1] Vol. xxix, page 1113, *et seq.*

not always require a few rigged small craft for performing some of the patrol duties on distant stations. The duties of the British Navy are so manifold that for economic reasons it may, perhaps, be desirable to keep a few rigged small vessels in commission during peace-time, not for the purpose of training their crews at shifting topsails, but for the purpose of saving coal if indeed it can be proved that there is any economy in retaining sails in men-of-war of any description, for they must have steam also, and spars, ropes, and sails cost money, wear out rapidly, and must be replaced; so that I believe it to be quite open to doubt whether masts and sails pay their expenses in *any* class of vessel. If my memory serves me, it was conclusively proved by Captain Colomb, when he was Captain of the flag-ship in China, that masts and sails in an ironclad did not save coal at all, let alone pay their expenses, that is to say, that they stopped the ship more in foul winds than they helped her in fair.

However, if it be decided to keep some rigged cruizers on distant stations in peace-time, there ought to be at least an equal number of modern fighting machines on the station laid up, but kept ready for use at the shortest notice, so that the crews of the cruizers could turn over to them whenever war seemed imminent; and although I do not at all hold by the principle of keeping two sets of ships—one for peace, and one for war—and having a great swapping match on the eve or outbreak of war, yet even that would be preferable to leaving our Officers and men to fight the enemies of their country in the style of vessel which we now see flying the British flag in all quarters of the globe; I mean the sloop and gunboat class, vessels which would be in the ridiculous position of being neither able to fight nor run, nor yet to carry despatches, their speed being altogether inadequate.

I do not, however, propose to dwell at any length upon our small craft, either cruizers or torpedo-gunboats, nor yet upon our *bonâ fide* ironclads of the "Admiral" or "Nile" and "Trafalgar" types, as I imagine that even our tarriest sailors do not propose to rig these latter, but rather to call attention to, and to invite discussion upon, a class of vessel which I feel sure we are all agreed should be largely increased in our Navy, namely, large, fast, powerful, coal-carrying cruizers for the protection of our commerce; also as to whether it would not be wise to unrig immediately all our present rigged ironclads on the assumption that they would be more powerful fighting machines without their spars and rigging than with them, leaving in their lower masts, and turning the tops into small machine-gun batteries protected with 3-inch steel armour.

I propose to consider first our present commissioned ironclads, as it is probable that some of the arguments which I shall apply in their case would be equally applicable to the cruizers; and, moreover, the former could be operated upon at once, whereas the latter may be said (in the words of a well-known phrase maker) "to be in the dim and distant courses of the future."

Now, the number of our rigged ironclads in commission is fifteen. Six of them have double screws, and nine of them have single screws;

and it will scarcely be disputed that if we can make out a case for unrigging the single-screw ironclads, our arguments will apply with still greater force to the double screws.

The principal arguments, so far as I know them, for the abolition of spars and sails in men-of-war, but more particularly in ironclads, are somewhat as follows:—Their weight causes increased immersion; they occupy valuable space both on deck and below, space which might otherwise be devoted to warlike stores. They mask more or less the fire of guns. There is a probability of wreckage from them fouling the screw in action. They cost money, and in the present state of the national finances, and in view of the desperate bids for popularity through the seductive avenue of economy, which some of our patriotic statesmen so well know how to make, it can scarcely be said that "money is no object." And, lastly, though perhaps the strongest argument of all, is the fact that the retention of masts and sails in men-of-war diverts so much of the attention, and the energy, and the resources of both Officers and men from the real work of their profession, and from the study of modern naval warfare, and occupies them in drills and exercises as obsolete for fighting purposes as the bow-and-arrow drill of the Saxons. It is the survival of an ancient practice in a very conservative Service, and is not altogether to be wondered at. Evolutions aloft are so attractive and so showy, there is so much swagger about them, our Admirals have always so highly commended and attached so much value to the smart shifting of topsails or topgallant masts, and so many First Lieutenants have worked their promotions out of the successful cultivation of this sort of seamanship in their ship's companies, that we seem to have lost sight of the fact that it has nothing to do with the fighting efficiency of a ship in the present day. I know it is said that a ship's company which is smart at drill aloft is sure to be smart at everything else. This I beg leave to doubt; it may be true in some cases, but even if it be so, I fail to see that it furnishes any sufficient argument for keeping up sail-drill. We don't teach men to make hats if we want them to make boots, and there is no proof that if extreme smartness and efficiency in gunnery, or Whitehead torpedo drill, or the rapid preparing and laying down of a line of countermines was as likely to be commended by the Admiral, and to get the First Lieutenant his promotion as the smart shifting of topsails; we have no proof I say that the same smart ship's company would not excel at these exercises with equal credit to themselves, and far more benefit to their country. In fact, I think the assumption is all the other way; but then we must get these fascinating playthings out of the way, for so long as they are there, they are sure to be played with.

The principal arguments for the retention of masts and sails in men-of-war are, I believe, three in number. First, the engines might break down, and without masts and sails the ship would be perfectly helpless. Secondly, masts and sails help to steady a ship in a gale of wind, and to stop excessive rolling. Thirdly (and this is the great argument of all), it is said that if you abolish masts and sails in men-of-war, and with them the fine, dashing, showy, somewhat risky

gymnastics appertaining to them, you will in a very few years lose altogether the hardy courageous breed of British seamen, with their many splendid qualities—the type of men who gained for England her supremacy on the sea, and laid the foundations of her Empire; and they say that with the decline of British seamanship we shall also see the decline of the British Empire.

Now, I propose to examine these three arguments in the above order:—First, the engines might break down. This, no doubt, is true; the very best engines might break down, and at a critical moment too. Well, the chances of both engines breaking down simultaneously in a double-screw ship are so extremely remote that I do not propose to consider them. Let us then take the case of a single-screw ironclad, and examine the consequences to her of a break-down under various circumstances. She might break down in peace-time in company with the squadron, and in that case she would be taken in tow by her consorts. She might break down in peace-time when alone, and in that case she would probably be reported by some passing vessel and very soon picked up, for our single-screw ironclads do not cruize much alone in remote and unfrequented parts of the globe. This, however, I am bound to admit is a case in which her masts and sails would be of some use to her, as we saw the other day in the case of the "Monarch," though I think that even in this case the chances of loss are too remote to justify their retention.

Then again, she might break down in a gale of wind on a lee shore, and in that case she would drift on shore just as surely, and rather more rapidly with masts and sails than without them; unless she were in a position to get soundings before she came to the rocks, and then she would have a better chance of riding it out at her anchors without masts and yards than with them.

Lastly—she might break down in action; and if it were a single action she was engaged in, she would certainly be rammed and sunk by her enemy, and all the sails in the world would not save her.

If on the other hand it was a general action that she was engaged in when she broke down, and if she were not rammed and sunk by a foe or perhaps a friend, she would be taken in tow at the conclusion of the battle by whichever side won the day; for I can scarcely imagine that anyone will suggest that if the enemy gained the day, any rigged ship would be allowed to escape under sail.

So much then for the use of masts and sails in the case of a break-down; though perhaps before I leave this section of the argument there is one more contingency that I ought to notice, because if I don't, no doubt the opposition will; I mean the contingency of an unrigged ship getting short of coal in war-time, and perhaps arriving at one of our unfortified coaling stations, and finding that the enemy had been there beforehand and burnt all the coal. It must be admitted that this would be awkward, but then the reply to it is—arm the coaling stations. This would certainly be a more businesslike answer to it than lumbering up our ships with masts and yards, and impairing their fighting efficiency in order to provide against a contingency which ought not to occur.

And now for the second argument: that masts and sails help to steady a ship in a gale of wind, and stop excessive rolling. This is partially true; but I submit that it is not necessary to retain square sails for this purpose. I have served in three ironclads, and my experience teaches me that the best way to treat them in a gale of wind, is to furl the square sails and lay them to under very easy steam, with the ship's head about two or three points from the wind, with trysails set, and the sheets hauled amidships. I have seen them tried under square sails, with treble or close reefed topsails; but in these cases they must be kept so much more off the wind in order to keep the square sails full, that they get more into the trough of the sea, and do not make nearly such good weather of it. I am informed that the new class of protected cruizers, as they are called, viz., the "Mersey" class, and also the belted cruizers (the "Aurora" class), are to have two light iron masts with military tops, and to set trysails only; and this I think is exactly as it should be. Of course they have double screws.

Before I proceed to consider the third argument mentioned above, for the retention of masts and sails in men of war, I wish to point out that the two first arguments, viz., the possibility of a complete breakdown, and the steadying of a ship in a gale of wind, are distinctly questions which involve the *safety* of the ship and crew, under certain possible circumstances; and I am willing to admit for argument's sake, that there may be some additional risk to a ship under certain conceivable conditions, if she has no square sails to fall back upon. If on the other hand it be admitted (and I must so far beg the question as to assume that it will be admitted) that a steamship of a certain tonnage can be made a more efficient fighting machine without square rigged masts than with them, the question which we have to consider is, whether the additional risk is justifiable, in view of the assumed increase of efficiency.

If we refer to precedents, as the lawyers do when they want to prove a case, we need not go further back than the brigs of thirty years ago: their large spars and great spread of canvas were supposed to add to their fighting efficiency: with smaller spars and less sail power they would have had less chance of overhauling an enemy or capturing a slaver; and notwithstanding that a considerable number of them capsized or otherwise came to an untimely end in consequence of being over-masted, it is not, I believe, recorded that their Captains proposed to reduce their sail power in consequence of the danger. On the contrary, I believe that they used to try and give them a little more sail, by rigging up skysails and moonrakers, so as to get another quarter of a knot out of them in light winds, and thus, perhaps, catch an enemy or a slaver. And so no doubt in the present day when one of our smart cruizers is engaged in an exciting chase, although skysails and moonrakers will not assist her, we shall hear of the Captain and Chief Engineer getting at the Board of Trade safety valve, and screwing it down another pound or two, so as to overhaul the chase: at any rate the risk won't prevent them from doing so, nor Board of Trade regulations either.

So much then for risks: there are risks in all things; there is risk in carrying gunpowder and gun-cotton in our ships; but they would not be of much use without them. The question is—How much risk are we justified in running with the object of attaining a certain end? I submit that the amount of risk which we run under certain possible circumstances, by denuding our ships of sail power, will be more than justified by the increase to their fighting efficiency, under all the much more probable circumstances which would be likely to occur in war-time. At any rate this is one of the points which I propose should be discussed: and I would venture to suggest that in doing so we bear in mind that it must be for war and not for peace that our calculations should be made; for I am deeply impressed with the necessity of keeping our ships absolutely ready for immediate action; and not having two equipments, one for peace and one for war.

Now with regard to the third argument which I have suggested for consideration, viz., that if square rigged ships be abolished out of the Royal Navy, there will be a complete decline in British seamanship, and a total extinction of that admirable and popular individual, the "British tar." This is what we are threatened with; and it must be admitted that when we look back upon the glorious records of our Navy, and remember the deeds that were wrought, and contemplate the Empire which has been built up through the direct agency of British seamen, the threat sounds ominous. But this is only because we love to dwell too much upon the past, and will not look ahead, and try to realize the totally altered conditions of modern naval warfare. Because, in short, we fail to give our seamen credit for being able to adapt themselves to these new conditions with the same success as they did to the old. This, I think, is unfair; and so far as my own experience goes, I can say that I have always found them perfectly ready to adapt themselves to all the modern and scientific engines and modes of destruction, no matter how contrary those modes and engines may have been to the traditions they were brought up in.

We might pertinently ask the question—What is a seaman? and I suppose we might reply, that a merchant seaman is a man who navigates a cargo of merchandise from one port to another, by the safest, quickest, and cheapest means. Some years ago he did it with sail power; now he does it principally by steam, because it pays better. And in like manner we might describe a man of war seaman as a man who navigates a certain number of guns or other implements of destruction, by the safest, quickest, and (I suppose we ought to add) cheapest means to any given point on the ocean, and fights them when he gets them there; some years ago he did this by sail power, now he will do it by steam. Masts and sails were only a means to an end, and that end was to take a certain number of guns into action; but if we can now take the guns into action with a hidden but reliable power, protected from the guns of the enemy, it would appear that masts and yards in action would only act as beacons above the smoke, to show the enemy where to fire, so that

it would appear necessary that they should be abolished, and with them, that particular type of seaman who used to work them so successfully; but I can see no good reason for assuming that his successor, be he seaman-gunner, stoker-mechanic, submarine-jolly-boat-man, or whatever else he may happen to be called, will be any less able to fight his country's battles than the old tobacco-chewing seamen who fought under Benbow and Nelson.

It is said also, that sail drill, exercises aloft, reefing topsails in a gale of wind, and all the different vicissitudes and perils of a sailor's life, are necessary, not only to develop muscle, but also to strengthen men's nerves, inure them to danger, and make them dashing and courageous; and there can be no doubt that the practice of old-fashioned seamanship, as carried out in our Navy, did have that effect upon the men. But shall it be said that in these days of inventive science we are absolutely unable to devise some means for strengthening men's nerves, and accustoming them to danger, without lumbering up our fighting ships with masts and sails? Surely such an acknowledgment would be humiliating in the extreme. Intricate steam tactics at high speed, and in very close order, ought to strengthen the nerves of our Officers; and as to the men, they could be given so many hours a day to fiddle with the live heads of Whitehead torpedoes with the detonators in; or they could be set to work to hammer sensitive fuzes into filled shell. At any rate I feel sure that the staffs of the "Excellent" and "Vernon" will find no difficulty in suggesting dangerous employment of some sort, if that is all that is required.

Our Navy is made up of matériel and personnel, as the terms go: and a proper adjustment of these two will produce what we all desire, viz., fighting efficiency; and it appears to me that instead of building and rigging our ships to suit our men, it will be more business-like to recognize and accept all the useful inventions and innovations of modern science, and train our men to suit our ships.

One of the serious arguments advanced by the opponents of railways when they were first proposed in England, was to the effect that they would destroy the breed of horses. It proved to be fallacious; but even if it had proved true, and every horse in England had disappeared and their places been taken by mules and jackasses, we should not have returned to mail coaches for the purpose of getting up the breed again.

I am quite aware that the advocates for the retention of masts and sails in our men-of-war do not propose to return to our nautical mail coaches of the three-decker type, but what they have hitherto succeeded in doing is to lumber up our nautical express trains (or what ought to be express trains) with a vast amount of old mail coach paraphernalia and stage properties, to the curtailment of their fighting power.

I have already observed that I do not propose to unrig our present cruizers with their single screws and very limited coal endurance, but until they are worn out and their places taken by double screw mastless ones, I should propose to increase their efficiency by modifying

their present rig very much, making it handier and less cumbersome; also that it should be relegated to an entirely secondary position in the ship, and not be treated as the primary reason of her existence; in short, that the boatswain and his ropes should be put into the background, and the gunner and his oil cans brought to the front. It must sound like rank heresy to nautical ears to say such things, and it is sad and mortifying to men who have been brought up as sailors to be obliged to acknowledge that the training of a life-time is deprived of the opportunity of bearing the fruit which was anticipated. "'Tis true, 'tis pity, and pity 'tis 'tis true," but there is no use in crying about it; the old order of things has gone by and can never come back, and in a very few years the genus boatswain will be as extinct as the dodo, and our children will marvel over his remains preserved as curiosities in the Greenwich Museum. But in the mean time, and before the boatswain becomes absolutely extinct, we must try and convert him into a more rational method of setting his sails. The rig and fittings of our men-of-war are altogether obsolete, and far more cumbersome than they need be for the purpose of producing the very small and uncertain amount of motive-power which results from their use. Every device and invention for saving manual labour with the sails and reducing the number of ropes ought to be adopted; we ought to give up all our old-fashioned man-of-war ideas as to how sails should be set and taken in. We should adopt from the merchant service the use of steam crabs on deck for working the ropes. Such rigged ships as must necessarily remain in the Service for the present, should carry one suit of sails only, and these should be made of very stout canvas, tanned, and screwed firmly on to the yards with metal screws by the armourer, so that they could not be shifted or unbent for exercise. They should be looked upon purely as auxiliaries to be set with a fair wind, and no drills nor exercises of any sort should take place with the sails; all drills and exercises should be with warlike stores. Of course, all studding sails should be abolished, and the number of ropes reduced as much as possible.

In this manner a great deal of space could be saved in a rigged ship both on deck and below, and this space devoted to more guns, torpedoes, and ammunition. Much money would be saved also, as I am sure that the boatswain's annual bill for the British Navy must be a pretty heavy one. One suit of tanned sails which were never shifted for exercise ought to last three years.

It is not necessary in a paper of this kind to enter any further into details; but any one who is acquainted with the rig of a man-of-war will acknowledge that one of our cruizers of the "Tourmaline" class for instance could, with fewer spars, ropes, and sails, spread just as much canvas as she does at present. Tanned sails would be much more durable, and would look far better, than the dirty, variegated, whitey brown articles which steamers set now.

Those who agree with me in the above remarks will no doubt recognize the fact that in order to carry out these views it will be necessary to alter long-established fashion. This is always a difficult

thing to do, but in a conservative Service like the Navy, with all its old and honoured traditions, it must prove exceptionally so.

Having devoted many years of my life to the study of old-fashioned seamanship, and endeavoured to instil its time-honoured maxims into the minds of the young Officers who have served under my orders, it will probably be said that I have "ratted:" perhaps it is true; but at any rate I have "ratted" honestly, and with the best intentions. Happily in our Service we are not influenced by the votes of enlightened pothouse politicians, but can say what we think without the fear of sacrificing our popularity, or losing our seats, and in the present controversy I shall certainly use whatever influence I possess in the direction which I consider best calculated to ensure the real efficiency of our ships. Neither has my conversion been a very recent one, for as long ago as 1882, when I paid off the "Inconstant," having had two years' experience in a detached squadron, I wrote as follows, in a small pamphlet which was not published, but sent round to a few of my friends:—

"The detached squadron has not been a success unless it be considered simply as an escort to the Princes during their visit to Australia and Japan, but as a training school for Officers and men it has not been successful, that is to say, it has not trained them nor exercised them in subjects which would be useful to the country in war-time.

"Sending steamers which sail badly to make long sea passages under sail is inconsistent with the spirit of the age, and with the rapid mode of progression which is now universal; it is waste of time, and both Officers and men know this and it disgusts them.

"The men read now much more than they used to do, and they know perfectly well that a high state of efficiency in 'shifting topsails' will be of no use to them in war-time, nor enable them to fight their ship any better than if they had never seen a topsail yard in their lives. They look upon it as a gymnasium at which so much useless work has to be done, like carrying shot or any other manual labour."

I then pointed out in some detail how I thought a squadron of the sort ought to be worked, but I will not inflict any more quotations on the meeting. There is, however, one subject closely connected with mastless ships *versus* rigged cruizers which I ought not to leave unnoticed, and that is the subject of lifting and feathering screws. I venture to think that both devices should be immediately abolished from men-of-war: they are only suitable to auxiliary screw yachts. At the best, a raised or feathered screw does not give a ship more than a knot, or a knot and a half extra speed under sail, and in order to obtain this perfectly useless (from a fighting point of view) quality of speed under sail we tamper with that most vital and rather delicate article the propeller, seriously and gratuitously increasing for ourselves the possibility of disablement to the ship. Quite lately we saw the "Calypso" disabled and practically useless for several weeks in consequence of deranged feathering gear; but luckily she had Bermuda dock under her lee; and still more lately we hear of her

sister ship the "Calliope" being delayed for several days from the same cause. We don't think much of these things in peace-time, but they might have very serious consequences if they occurred in war-time, and I know of no reason why they should not. But as long as we have training squadrons cruizing about the world under sail for the purpose of carrying out exercises of an obsolete and useless description, so long shall we have the Captains of the ships composing those squadrons advocating the retention of feathering and lifting gear for the screws, for no man likes to see his ship the dummy of the squadron. And although I have no doubt in my own mind that the gallant Captains who command the ships of our training squadron are perfectly cognisant of the absurdity of the farce they are enacting, yet I feel equally sure that if they were ordered to propel their ships with oars like the Venetian galleys, both they and their crews would enter heartily and loyally into the spirit of the thing, and practise the art of sweeping with all the energy which they now expend on setting studding sails and shifting topsails, and each ship would vie with the others to secure the proud position of "first ship in the squadron."

Before concluding I would beg to call attention to one other matter which seems to be closely connected with the subject of my paper. I allude to the plan of keeping our Officers and men employed in ships of an obsolete type for the purpose of wearing out the old ships, and preserving the new ones until they are wanted for war. I have long thought this system a mistaken one, as I believe the Officers and men ought to be trained in, and learn to accustom themselves to, the machines they will have to fight in. Even in the old days when ships were all very much alike, and their guns and fittings were similar, it was a well-known fact that a newly commissioned ship was never in the same state of efficiency as a ship that had been some months in commission. What then must it be in the present day, when we have such a number of different types of fighting ships, and such varieties in their armaments and equipments? There must necessarily be more reason than ever for training the men in the actual ships they will be expected to fight in. I believe that if we were to ask the late Captain of the "Inflexible," or the present Captains of the "Colossus" and "Agamemnon," how long it took them and their ships' companies to find their way about their ships, and to become thoroughly at home in them, we should be startled at their replies. The interior complications of a man-of-war have so very much increased of late, that I think we might name six months as the shortest time in which one of our large modern ironclads could be got into a thorough state of efficiency with a strange crew; but we are told that wars break out much more suddenly now than they used to do, and last a shorter time. Moreover, the changes in naval construction and in all war materials are so extremely rapid that some of our new ships which have taken longer than necessary to build are obsolete in some respects before they are even put in commission. All these things I submit point to the conclusion that the proper course to pursue is to keep our Officers and men employed in the very newest

types of ships, with all the latest improvements and inventions, keeping the older or semi-obsolete ships as the reserve, they being far more suitable to our reserve men (coastguardmen and others) than the new ships would be. By this method we should be making the best possible use of our ships and our men, and on the outbreak of war we should find ourselves with a force of the most modern and effective ships, with their crews thoroughly accustomed to them, ready to strike an immediate blow without the delay of days, weeks, or months, which must take place if the opposite system be pursued.

By keeping ships like the "Minotaur" and "Agincourt," with their masts and sails and present armament, in our first line of defence, we are simply making ourselves the laughing stock of Europe. We are not ready for war, and thus we invite attack.

The CHAIRMAN: I think you will agree with me that we have had a most able paper upon a most interesting subject. I so perfectly agree with nearly all that Captain Fitzgerald says, that it is difficult to pull any part of it to pieces. The only points that occur to me will rather go to strengthen his argument than to weaken it. In the first place, we all know as sailors that the principal object of the exercises aloft was, after an action, to be able to run out of it, refit, and come back again to renew it, if necessary. That, of course, is entirely a thing of the past. Now-a-days in any of the late small wars, or in the one large one, the late Russian War, the first thing to be done in preparing a ship for action was to reduce her spars as much as possible, so that she might be without top hamper, and if you were obliged to have anything aloft, you generally rigged up all sorts of things to catch it, if likely to come down. That is a very strong argument for doing away with masts. Then another thing which he mentioned—having steam-crane power on the quarter-deck and forecastle—would, I think, be eminently useful to us in the way of getting up shot and shell. The shot and shell of these big guns are an enormous weight, and mechanical power of some kind is requisite to handle even the lighter ammunition of guns not loaded by mechanism. I know that gymnastics are good, even necessary, on board ship. Still I submit that the only argument for retaining masts and sails in our present fighting machines is, that we may have to blockade an enemy's port, and, of course, however little coal you expend, you would certainly use a considerable amount in keeping your fires banked, and then the sails might be useful. The alternative, under such circumstances, would be to adopt some method of sending a couple of our ships to the nearest coaling station in turn, if no method could be adopted to coal at sea, and in that case the squadron would be weakened I allow; otherwise, I really cannot think of any fresh arguments for retaining masts and sails, and, together with Captain Fitzgerald, I shall be very glad to hear anything that can be said in support of them. I hope that some of the Officers present will discuss the question on one side or the other, and perhaps Captain Colomb, who I know has very strong opinions on these subjects, will kindly open it.

Captain P. H. COLOMB, R.N.: One thing must have struck us all, namely, that the gallant lecturer has lost none of his humour, none of his quaintness, none of that curious terseness of expression which is so peculiar to him, and none of the vigour of his style. In the early part of his paper he made allusion to placarding railway stations. Now travellers by the Underground Railway have no doubt noticed of late months the picture of a gentleman—ostensibly a gentleman in the Royal Navy—who is I was informed by a young Officer by my side, in the act of saluting. His cap is evidently too small for his head; he has got on a monkey-jacket and has a hand in its pocket; he has no braces on, that is quite certain, because you see under his waistcoat the buckle of his belt to keep the trousers up. If you look a little further, you will see that he is standing on the deck of a ship, with evidently steel bulkheads: he is by the side of a muzzle-loading rifle gun. That gun is mounted on a carriage evidently of steel, but it is of the old pattern and

has got the old trucks, and a very vague sort of breeching, as to the only thing which controls it. That, gentleman, is a representation of Mr. Terriss acting in the "Harbour Lights." What is the history of that picture? It is painted to meet the sentiment of the gallery. The instructed naval Officer knows perfectly well that is not what we are going to have on board ship; he sees incongruity between the steel bulkheads and the muzzle-loading rifle gun, the loose breeches of the man, his flyaway tie, and the general vagueness and breeziness about him; he knows very well we have passed that time of vagueness and inaccuracy, and that we are in a time of precision and accuracy of all kinds. The sentiment of the gallery is the same sentiment which surrounds us now with regard to sail-power. We have heard some of the arguments detailed by the lecturer as to the reason why sail-power should be retained. I used to think myself that those reasons were really put forward—I won't say honestly, because of course they were put forward honestly—but from the heart. Now, of late years I have come to think that this was not so. That it was the loss of the poetry and romance of the sails that troubled him, and he was trying all he could to get some sort of excuse for hanging on to that old pleasant time, when there was some poetry about a ship. One of the reasons you know that has been given is the economy of sail-power. Well, I made it my business to show in a paper which has been alluded to, nine years ago, I think, that it was an entire mistake to suppose that there was any economy in fully rigging steam-vessels; that in fact all the rig you put into her costs you coal. I showed in the flag-ships on the China Station that the very least cost you could estimate for the pleasure of carrying about masts and sails was 1,730*l.* a year. I traced the ships through long distances, the flag-ships through 23,000 miles, another ship, the "Dart," through nearly 12,000 miles, and another ship, the "Egeria," through nearly 11,000 miles. Every mile and hour was accounted for, and I showed in those three ships that it was not possible to look at the question without coming to the conclusion that the economy was a dead loss; that it cost you more coals to carry about the masts and sails than you gained by them. When we have been talking of the economy to be got from masts and sails, we have not taken one single step to produce this economy. The rig we put into our ships is not such as to create an economy, and yet a rig tending to economy is under our eyes on every ship that passes us; every sailing ship in the mercantile marine, which is rigged scientifically in order to get the best they can out of the sails; that is to say, that the strong heavy sails, which are of the greatest use in strong winds, are small, whereas the light sails, which can only be set in light winds, are very large. The top-gallant sail in the merchant ships is the biggest sail of all, and naturally so, because it is of no use setting a small area of sail when the wind is light, although a small area of sail when the wind is strong is necessary. So that we have taken no steps to make a real economy; and that is one of the things which convinces me that we never meant economy years ago when we talked about it, but that it was the sentiment that was troubling us. Economy of sail-power, whatever it might have been, is disappearing before the advance of the improvement in steam-power every day. When I read my paper nine years ago, the compound engine, as it was then called, was just beginning to be noticed; then you expanded your steam twice; since then, the engines have been triplicated and are now quadruplicated, with the result of an enormous saving of coal. I do not know what it is, but I suppose that in the nine years that have passed, the consumption of coal must have been reduced by one-half. There is also close upon us a tremendous revolution in further economy of steam-power in the advance of liquid fuel. Talking to some City men the other day, I was astonished to find that the view of the City is, that coal will disappear as a means of locomotion almost before we can look round us. It is going as fast as it can, and the economy both to men-of war and merchant ships will be tremendous when that change comes. The next claim which is made for the retention of sail-power is a falling back from economy. We did not hear of it until the question of economy seemed to be disappearing: I refer to gymnastics. I rather wonder that the lecturer did not make a very nice answer to that, namely, that in Her Majesty's ship "Minotaur," which is especially supplied with masts and sails in order to be a gymnasium, they have also supplied a regular gymnastic apparatus, because it is found that the masts and sails were not sufficient for gymnastic pur-

poses. At any rate, if the gymnastic apparatus is not supplied, I know that an application was made for it, so that I think with reference to masts and sails, the gymnastic argument disappears. Then we have heard from the lecturer of the necessity of training muscle and mind together. No doubt a man aloft in a gale of wind is undergoing a training for the combined exercise of muscle and mind, which is not to be got, I think, in any other way. The point of the matter is, that for the modern war ships muscle and mind combined are not so necessary: there is plenty of mind wanted, but the muscle is supplied by machinery, by water-pressure, by air-pressure, by steam-pressure, and so the necessity for that kind of training has so far disappeared. But reverting for one moment to the gymnastic part of the business, I think our seamen are getting fatter than they were. I notice it every day, but I am afraid I also notice when I go down to Portsmouth and the Channel Fleet is in the harbour, that there are more fat seamen knocking about than there are when the Channel Fleet is away, and I am not at all sure that fat seamen are more prominent in mastless ships than in others. I know that in the mastless ships I commanded in the Mediterranean we took certain measures, and the men were not a whit fatter than men in the masted ships. One of the last arguments I have heard advanced in favour of the sail-power of the ships is, that in war-time there would be sailing vessels taken as prizes, and that it is absolutely necessary that you should have people trained to work them. There is one thing that everybody is quite certain of, and that is, that no single sailing vessel that is liable to capture will ever go to sea in any future war. The next answer is, whether you like it or not, even in peace-time sailing ships are disappearing off the face of the earth. In 1885, 1,035 sailing ships disappeared from the English list. Last year there were 53 or 54 disappeared from the Italian list, though the Italians have been holding very tightly on to sailing merchant ships. Sailing ships are going as fast as they can, and the advances in the economization of coal which I have spoken of are bound to hasten their departure. The conclusion I come to is this, when I read my paper nine years ago we were very serious; now to-day I think we have been rather more inclined to be humorous than we were in those times; and when you come to laugh at a thing, you may be pretty sure that thing is going to disappear very soon. If we could laugh a little at the Parnellites, I think they would disappear pretty soon. But it is, after all, the sentiment which clings about us. If my brother Officers will just recall to their minds for one moment these things, they will see exactly how strong that sentiment is. You have been thrashing against a foul wind for days, perhaps weeks, and you are sick and tired of it. Suddenly some fine nice afternoon, when you are thrashing and pounding, and wretched and miserable and wet, a pipe goes "Watch, trim sails!" You have a sudden silence throughout the whole ship: all are listening for what is coming. The Officer of the watch cries, "Weather after braces." Instantly there is a splendid cheer throughout the ship. The elements had been beating you; you had by chance overcome the elements; that was in old days. Now the elements never beat you; you start with being their master. There is no fight, no fire, and no romance. The romance of the ironclad, and the romance of steam and the romance of heavy guns will come by-and-bye, and the poetry of it will come too. I am going to quote a little poetry to finish with, because it will partly explain what I mean. The poet Campbell, in apostrophising Hope, says:—

"Friend of the brave! in peril's darkest hour,
Intrepid virtue looks to thee for power;
To thee the heart its trembling homage yields,
On stormy floods, and carnage-cover'd fields,
When front to front the banner'd hosts combine,
Halt ere they close and form the dreadful line.
When all is still on Death's devoted soil,
The march-worn soldier mingles for the toil;
As rings his glittering tube, he lifts on high
The dauntless brow and spirit-speaking eye,
Hails in his heart the triumph yet to come,
And hears thy stormy music in the drum."

Now when a poet will set to work and do for our ironclads and mastless ships what Campbell did for the bugle and drum, we shall not hear much more about sails.

Captain Bowden Smith: I hope it will not be thought because I rise to speak after Captain Colomb that I am going to oppose what he has just said. I too, with the exception of a few details, so entirely agree with what has fallen from the lecturer, that I shall only occupy your time a few minutes. In fact it is only something that he said towards the end of the lecture which causes me to rise at all: it is with regard to our men being employed in what he calls obsolete ships, and also the remarks he made with regard to training or flying squadrons. With reference to the training squadrons, I gather that he spoke rather contemptuously of them, or perhaps I did not quite understand him. If he means that it is waste of time for training squadrons to go to sea and flop about for days in a calm, waiting two or sometimes three days together for a breeze, I can agree with him; but flying squadrons and training squadrons, when efficiently commanded, have done and are doing a great deal of good, and I for one was very glad when the present Board of Admiralty started them again. I admit that they do not teach modern warfare, but we must remember that every year we are turning out a certain number of young Officers, and what is perhaps of more importance, a great many young ordinary seamen from our training ships, and nothing can be worse for those young fellows than to be left hanging about the home ports or in harbour ships. As I said before, we cannot teach them modern warfare, but you can teach them discipline and a certain amount of gunnery, and, what is very important, sea habits, and to find their sea legs. I would not for a moment advocate building any more obsolete ships to take the place of our present frigates and corvettes, but we shall always have a class of ships which will have to keep the sea, a class of ocean cruizers, and with these you may go on doing something of the same kind in the future. For the present I cannot see that we could make better use of our frigates and corvettes than by employing some of them in taking our young seamen about the world, and as for the Officers themselves, they could not have better exercise, keeping station, especially at night, and best of all going in and out of harbour, is always useful and profitable experience. With regard to what the lecturer implied about keeping our men going in the present obsolete iron ships, I scarcely think the powers that be, up to the present moment, have had much choice in the matter. I am not going to say a word in favour of keeping our obsolete old ships going longer than necessary, but I do not think the lecturer or Captain Colomb either would say the "Devastation," the "Thunderer," or the "Rupert" are the proper sort of vessels for men to cruize about in in the Channel Fleet. I have not a word to say against these ships; they are most formidable fighting machines, but not suitable for ordinary cruizing, and until the Admiralty have got sufficient modern ships, I do not see that they have any alternative except to use the present masted ironclads for the Channel Fleet. But now the time has come when we have sufficient modern ships, and I hope sufficiently armed to enable us to have our Channel and Mediterranean Fleets composed entirely of these mastless first class ironclads; and then I shall hope to see the second class ships take the place not only of the reserve ships at the coastguard stations, but also replacing our present absolutely useless and very expensive three-deckers at the home ports. Vessels of the "Hercules" and "Northampton" class could swing in Plymouth and Portsmouth Harbours; they can be kept in order by harbour crews, and they, with a few torpedo-boats attached, would certainly be of some use in time of war to protect our own shores, whereas every shilling spent on the maintenance and repair of these old wooden hulks is absolutely money thrown away. I remember talking over this matter with a very distinguished Officer last year, who is now in the Admiralty, and he said we could not carry out that plan, because we could not make the men sufficiently comfortable. I may say I cannot quite agree with him. I admit that the men ought to be made comfortable when awaiting draft in the home ports, but the "Hercules" or "Northampton" class, by the addition of a few stoves in winter, and sashes for their ports, could be made sufficiently comfortable to accommodate a considerable number of men.

Admiral Boys: Although I feel somewhat in the fossil stage of my naval

career, I must congratulate Captain Fitzgerald upon this paper, and individually I venture to say I agree with a great deal that he has said. There are still, however, one or two points that I might refer to. I for one give up the old sails with a great deal of regret; they have made us what we are, and although I feel they may to a great extent be discarded, I cannot think that the time has arrived for their total abolition. The lecture reminds me somewhat of the story in the cookery book about cooking the hare, in which the first thing we are recommended to do is to catch the hare. Now Captain Fitzgerald seems to have lost sight a little of this. I look upon the hare as the coals. In mastless ships the first thing is to catch your coals. In war-time you won't find coal wherever you may be in every part of the world, even with occasional coaling stations available. You could not go into Rio to coal, or into Monte Video or Coquimbo, and many other ports now used for coaling would be closed. Coal being the actual and sole moving power of such ships, we might be placed in great difficulty. In the case mentioned by Captain Fitzgerald, the "Calypso," whose feathering screw was disabled at sea (I am not an advocate for feathering screws), but she, having sails, sailed into Bermuda to be docked. If it had not been for those sails, and had it been war-time, there would have been a much greater chance of her being picked up and captured by an enemy than if she had been without them. Then with regard to our training squadrons, I must say I agree with what Captain Bowden Smith has said. I happen at this moment to have frequent communication with the Training Squadron. From a letter received the other day it did not appear to me that they are wholly engaged in their sail drill. One exercise I may especially mention, viz., getting down the mainyard and placing it fore and aft on deck; this was very good practice in dealing with heavy weights, in handling purchases and tackles, and such like gear. Then again all the ships of the squadron ran into harbour and took up their anchorage at night under sail. Such instruction is very good for young Officers and seamen, and I think great consideration ought to be given to the subject of training squadrons of sailing ships before they are entirely given up. As regards sail-power in the larger vessels, I agree with the lecturer, that in ships with double screws and double engines entirely disconnected with each other, sails are not necessary, but in ships that have single screws, or even double screws with single engines in which anything happening to one engine may disable the ship altogether, there should be some reserve of mobility by means of sails. For instance such ships as the "Hercules" and the "Sultan," which cannot be called obsolete, and are as good fighting ships as the majority of the ships they are likely to meet as enemies, I do not think it would be wise to wholly deprive them of their sailing powers, which are by no means despicable. I can only add my thanks to Captain Fitzgerald for his paper, and I hope there are some young Officers in this theatre who will give us their views on this subject.

Admiral SELWYN: If any cheers of mine could help Captain Fitzgerald, I would spend my last breath in raising them. The paper breathes the true spirit of progress, and if it be followed up as it should be, I am quite certain our difficulties will disappear, including a great many of those which have been stated in the discussion. Among others I can assure Admiral Boys that I caught his hare twenty years ago, that it has been waiting for gentlemen to come and see it cooked; that twenty years ago I proved beyond doubt or question, in experiments made for the Admiralty at Woolwich Dockyard, that you could get three times the value of coal out of condensed fuel, and from that date I have pushed that thing forward. There it is running now at this moment for you (alluding to a boiler of 40½ horse-power, just outside the lecture theatre). As it has been running during two years, I am very sorry to say very few naval Officers comparatively have come to see it except foreigners; we have had plenty of them, Russian Admirals, German Naval Attachés, and others, but of our own Officers few have chosen to come. I am delighted to hear that Captain Colomb considers that even in the City they have woke up to the question of doing without coal. As to the risk of which Captain Fitzgerald spoke, it is quite clear that we have always considered it was cheap to risk the vessel to attain a certain end; not only anything belonging to her personnel or matériel, but the whole ship itself must be risked whenever there is sufficient reason for doing it. Therefore, *cadet quæstio*, there can be no doubt whatever that Officers in vessels,

squadrons, or fleets are bound to risk those vessels whenever the object seems to them to be sufficient to justify it. As to saving boilers, I regret very much that on that question there still seems to be a great doubt. People keep the ships in harbour to save the boilers, when they could have had for sixteen years past boilers that never wear out, which under no circumstances are ever destroyed. Mr. Perkins showed it in this theatre. It has been running about the world ever since, but nobody seems to pay any attention to it. Those are the points to which Captain Fitzgerald's paper draws attention in advocating progress. I have been an old advocate for progress, and I lament to see that so much prejudice, so much—what shall I call it?—reluctance, to adopt these things which can be done, has still kept us back in the rear of other nations. As to fuel, there is no difficulty whatever. If you take the most condensed fuel it will give you six times as much fuel as you carry now with the same weight, and with no stokers at all. If you take that fuel you can replenish it at sea wherever you like to do it. You do not want any coaling stations at all. You may want oil stations, but nature has provided them for you all over the world. We have just had the most recent advices from British Columbia stating that oil is found there, while all along the coast of Peru as far back as the time of the Jesuit Acosta, in Queen Elizabeth's days, it has been known that oil existed. It is now being worked in the Gulf of Suez, and there is no difficulty whatever in obtaining it in any part of the world wherever you choose to say you will take it, and obtaining it at a price even in this country which will not exceed 21*s.* a ton, each ton being equal to from 3 to 6 tons of best steam coal. I do not think there ought to be any question about that. I quite recognize that it would be a difficult situation to find one's self, even with double screws and the very best fuel, if your machinery is deranged in such a way that you have no power of motion. I should not like to wait until somebody came to pick me up, and should go to work to get up some kind of locomotion. Now there appears to be in this military mast a magnificent and easy mode of getting better motion than you ever did with the best sails that were ever carried, applied to the screws. If we take the military mast as consisting of a hollow tube, and put round it a ring which is capable of moving round the mast, and which may be supported on frictionless bearings, and has a cog wheel attached, you can then make it support any derricks you choose to carry. You can have one or more, in fact as many as will complete the circle. If you then put a bevelled wheel which conducts the power to the twin screws, you can move those screws round at a rate which will be proportionate to the speed of the wind. When those derricks are in use for the purpose of moving the ship, they go down nearly horizontal, and extend nearly to the beam of the ship. You then get in any wind, whether ahead, astern, or abeam, or in any other direction, a power capable of propelling your vessel at the rate of 4 or 5 knots.

Captain FITZGERALD: You cannot propel her against the wind.

Admiral SELWYN: You can propel her directly against the wind. I have seen it done over and over again in models, and when you come to consider the reason why, I think you will understand it. It was done at Woolwich Dockyard, in 1856, in my presence; the vessel was propelled dead in the eye of the wind. The reason of it is this, it is a very easily understood thing. When you have got a screw working in water, the wind power is nothing but a power; it does not matter whether you derive it from steam or from wind, it has no relation whatever to the work of the screw. If you revolve that screw by whatever means you drive the ship ahead, it matters nothing whatever. Any engineer will tell you that that is perfectly true, that it can be done easily; there is no difficulty whatever about it. So that if you choose to have it there can be a mode of getting up a rig which will propel your vessel. Anybody can make a model which will run across the Serpentine or the Round Pond, or anywhere else dead in the eye of the wind, as I have seen it done over and over again. Next with regard to prejudices which have obtained hitherto as to doing away with masts. Every word that Captain Fitzgerald has said I join in heart and soul. He has told us it is a question of navigating a certain number of guns. There I perfectly agree with him. You must consider how many guns you can carry in a ship, and when you do so consider it you will abandon ships that won't carry a large number of guns. The whole question is one of the progress

of the scientific world in opposition to nothing but prejudice and ignorance, and the sooner we set to work to fight that, the sooner we shall have an efficient Navy, of which we shall all be proud, whether it be moved by steam or any other means.

Captain CURTIS: I do not wish to speak in direct opposition to the lecturer, because I agree with him, and if I may so say he agrees with my former arguments. Now I do not think we have quite conquered the elements yet, because we find that the storm waves wash the men about the decks, and so kill them; it is a common occurrence, also vessels rolling their boats away. I believe the ship should be kept in certain states of the elements bow on to the sea; that is the proper way in which she should ride out a gale unless she has to make a passage. I may mention a case that occurred some years ago as showing the utility of sail-power to accelerate a paddle steamship in an emergency. The late Captain Hoseason was despatched in the "Inflexible," in 1845 about, to the Cape, where there was an insurrection. He took advantage of the trade winds, and made the Cape in forty-three days, averaging 200 miles per day. That was considered a most extraordinary quick voyage, going to the Cape without coaling, and starting 80 tons short of coal. I would recommend young Officers to study the track chart of that vessel, in order to see the route taken. Young Officers consider it irksome to be kept at sea. I have been kept eighteen months in harbour at Malta, and for my part I considered it more irksome to be kept in harbour, and not have money in pocket to go on shore. Keeping a young Officer at sea gives him energy and discipline, sea legs, and nerves him up, in fact makes him a nautical man. I do not say that seamen should jump about like acrobats; I have often been told that Dutchmen are not very smart men aloft, but they are very hard hitters, and I think our people would be able to hit as hard without crossing royal yards, &c.[1] Captain Fitzgerald has referred to his former paper, and I hope you will allow me to put a question, because I am not familiar with the ships of the present day, viz., whether this wonderful column or tube, which contains 500 tons of water, is kept in our ships to steady them at sea, because I consider that seamen wish to keep the water outside the ship, and not inside.

Captain FITZGERALD: Captain Curtis is mistaken. I condemned that, if you remember.

Captain CURTIS: That is satisfactory. I consider, for instance, a voyage to and in the Pacific, it is absolutely necessary that you should have fore and aft-rigged ships, possibly square-rigged forward, as cruizers, and also the smaller vessels. In case of war you could not coal till you got to the Falkland Islands, and from the Falkland Islands you have to take another jump of 6,000 miles to Vancouver. The thing is in war you would have to keep on certain trade routes, unless you had vessels to meet you at sea[2] to coal. I must say I think under certain circumstances a ship is not seaworthy without sails, so that she can keep her bow on to the sea, and prevent her wallowing in the trough of the sea.

Lieutenant HENRY CHAMBERLAIN: I have been out of active service for about six years, and I should have preferred to have seen some active young Officer get up. I think the general opinion throughout the Service, from what I can gather among the young and rising Navy, is, that Captain Fitzgerald has hit a very good nail on the head. What *has* to come had better be accepted courageously. Officers who joined the Service even so lately as twenty years ago, joined brimfull of the traditions handed down to them by their fathers. They respect those traditions, but the poetry of the Navy has entirely disappeared. The true way to meet that is

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[1] Exercise aloft used to be overdone in Tahiti Harbour. I was in a corvette on one occasion; the Captain kept the men sending up topgallant masts, crossing topgallant royal yards, loosing sails, hauling out to a bowline, &c.; striking bowline, repeating it from 7.50 A.M. to 1 P.M. Two men were invalided from the effects.

[2] In event of war, provided you were certain of coal or oil supply, the masts could be landed; possibly tubular built masts could be used. Sails and spars would do for torpedo protection of an anchorage. Canvas to stop leaks. For economy and utility we want some of the late Sir Joseph Whitworth's spirit in the construction of ship material, then so many stores would not be required.

to remember the cause which prompts every good Officer to join the Service. It is not for the sake of poetry, not for the sake of tradition, but (under the circumstances which from time to time exist, and which are capable of alteration) to produce the greatest amount of safety for the commerce of your country. In whatever shaped ship, in whatever way the ship may be propelled, the sole object in view which you ought to have is to protect the commerce of your country, and to keep the flag flying in various parts of the world. You must drop everything else. The best Officer will put every question of sentiment in the background, and put his duty first. Let us take one of the greatest Officers that ever lived, Lord Nelson. What would Nelson do under present circumstances? I think that is a very good way of looking at it. Nelson, under whatever circumstances he was placed, did his very best for the honour of his country. His last word was "duty," and it is our duty as naval Officers to accept the new conditions. He only looked on masts and sails as a means to the end. The value of masts and sails has disappeared, and now we must look to the coal or the liquid fuel. We must devote our attention to protecting the coal, the coal in our coaling stations, and the coal on board ship. We must also look very much to the protection of our anchors. Now, an anchor which was of great value formerly, is of double the value now that actions may be fought near the coast, and ships may be driven ashore. Half the ships we captured at Trafalgar were lost on the Spanish coast, and we lost a number of our own owing to the anchors being smashed to pieces and the cables cut. All the ships which are mastless—I believe I am speaking correctly—are well supplied with anchors. Those anchors are placed in exceedingly prominent positions; but would it not be possible, with the great fertility of resource which we have in our Designing Department, so to put the anchors that they are always ready for letting go, but that they and their cables have some sort of protection? If not, at the end of an action, you will find they are all shot away, and then the position Captain Fitzgerald referred to of being on a lee shore and able to anchor will not be the case, because you will be on a lee shore, and unable to anchor. I think that is an important thing.[1] The question of a mast being shot away in action has not been touched upon except in the paper. It would be almost impossible, if a mast were shot away in action, to clear the wire rigging away, not because we do not possess sufficient means of doing it, but because the men, being exposed to the fire of machine-guns, would be unable to perform any work which would occupy perhaps more than a minute at a time. There is another question, that of raising the screw. Of course screw wells would be done away with, and the power of steering your ship would be very much increased. You would be able to construct your ship with a much finer run, and you would increase your steering power 15 or 20 per cent. The only difficulty in the paper that I see is that if one agrees with everything that is said there is very little to talk about. It is almost the fault of the paper. If Captain Fitzgerald had made one, two, or three pegs on which one could hang an argument, very good, but he has done the reverse, and therefore it is very difficult to comply with the request that we should criticize.

Captain FITZGERALD: I think you will admit that in replying I have not a very difficult task to perform. Captain Colomb's remarks I need scarcely touch upon, as he so entirely agrees with what I have said. He laments, as we all do, the loss of the sails, as it deprives the Navy of all its romance, and he supplies us with a little poetry to make up for the loss; and I sincerely trust that there may be some poetry attached to liquid fuel and smoke. But it is not a question of poetry. In these practical days we cannot afford to deal with the poetical or sentimental side of the subject; it is a question of whether we should not look ahead and see what is coming. I do not know that I was surprised at what Captain Bowden Smith said.

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[1] With reference to the great advantage to be derived by protecting the anchors from the effects of the enemy's shot, *vide* an article entitled "The Monitors," by J. Ericsson, in the "Century" magazine, November, 1885, to April, 1886. In the same article it will be seen that, during the American Civil War, several monitors and some square-rigged ships rode out a heavy gale together, the *masted* vessels being the only ones which dragged their anchors.—H. C.

It was very natural, seeing that he did have a hankering after training squadrons. He admitted that you cannot, in one of the modern training squadrons of rigged ships, teach modern warfare, but he pointed out that you taught something else. Why can you not teach modern warfare? Because your training squadron is composed of rigged ships. Send them out without masts and they will have to practise modern warfare. They will have nothing else to look at. If you hold out other game to them they will chase it as long as it is there. Admiral Boys tells us first to catch the hare, by which he meant coal, and that you have to sail to catch the coal. That I cannot admit at all. Sails in actual war would be no use whatever. A ship caught under sail by an enemy would be no better off than if she had no masts and sails at all; she could neither run away nor fight under sail. I cannot see myself that they are of any good, besides we are not building any more ships of the rigged corvette class, all our new cruizers are mastless, hence the importance of looking ahead and training your men, and accustoming yourselves to the ships that are coming. It is no use looking back at what is past; that has gone, and cannot return. Admiral Boys quoted the case of the "Calypso," with her feathering screw, and said if she had not had sails to sail to Bermuda, she would have been in a bad way. Then I say she had no business to have a feathering screw; if she had not had a feathering screw she would not have broken down. Admiral Selwyn certainly gave us some information about liquid fuel, and if it is going to effect the economy which he says, I am sure we shall all be very glad of it. If we can carry more fuel, for a greater number of days' steaming in the same sized ship, it will only strengthen my arguments for doing away with masts and sails. I do not know whether we have stores of liquid fuel in England in the same way that we have coal, but at any rate if it is proved to be so many per cent. more economical, it is quite certain we shall get it somehow, whether we have to go to Russia and buy it, or can dig it up on the banks of the Suez Canal, as Admiral Selwyn tells us. I do not know that there are any other important points to answer, and I am sure I am very much obliged to you all for your very friendly criticisms.

Captain BOWDEN SMITH: Would you recommend the masts to be taken out of the present ships and squadrons sent to sea without masts?

Captain FITZGERALD: No, I would not dismast the corvettes, but I would not have training squadrons in which the principal object was to drill the men at sail drill. That is the principal object of our training squadrons, and that is the point with which I find fault, because they devote their whole attention to obsolete exercises, as I take them to be. If it was not for their masts and sails they might be at something else which would be useful.

The CHAIRMAN: I think, ladies and gentlemen, nothing remains but to ask you to join with me in returning Captain Fitzgerald our best thanks for this paper. It is a subject which has occupied the minds of a great many naval men for and against, and latterly very much so. I consider, from the feeling of this meeting, that Captain Fitzgerald has certainly the majority on his side, but whether he has or not he has no doubt done his best to answer the questions which have been raised against it, and I ask you to join with me in returning him our cordial thanks.

Friday, February 25, 1887.

MAJOR-GENERAL E. H. CLIVE, late Grenadier Guards, Commandant Staff College, in the Chair.

MAGAZINE AND REPEATING RIFLES.

By Captain WALTER H. JAMES, F.G.S., late R.E.

IN response to the invitation of the Council of this Institution I have undertaken to lay before you a brief summary of the present state of this question, the most important one which now demands a solution from our military authorities.

What is it we seek to obtain from the magazine or repeating rifle? Surely the rapidity with which a good form of single-loader can be fired will suffice. With the Soper rifle forty-three well-aimed shots have been fired in a minute, and what more can be desired or required in war?

This argument, though usually brought forward as a reason against the introduction of repeaters, does not really deal with the true reason for their adoption. In a lecture I gave in this theatre seven years ago, I said, "The future undoubtedly lies with repeating rifles. The advantage of this form of weapon is that it enables a sudden shower of bullets to be poured in at a moment when increased intensity of fire will decide the victory."[1]

This sudden intensity, this conversion of the shower of bullets into a blinding rain, is to be obtained from the magazine rifle alone. It is for this gain that we face the additional complication due to the repeating action, it is for this great quality that the nations of Europe are spending millions of money in the re-armament of their infantry, and that we too must follow their example.

No breech action, however rapid, can give the same rapidity so long as the magazine supply lasts. In a properly constructed magazine rifle the time taken to press the cartridge into the barrel is eliminated. Drawing back the action cocks, throws out the old case, brings up a fresh cartridge. Closing the breech pushes the cartridge home, which is therefore never touched by the man's hand; he has not to take it from pouch to the breech.

The magazine rifle has one other advantage, besides that to which I have just alluded, viz., the moral support which it gives to the soldier, who knows that he has a reserve of power constantly at hand. No single-loader can give that confidence which a man feels who has five or more shots at his instant command.

[1] Vol. xxiv, p. 384.

A repeating rifle is of advantage both on the offensive and defensive. Troops, whether acting on the one or the other, have to pass through that supreme moment when the combat trembles in the balance, and to both alike the special quality of the magazine arm is of the highest importance. Conceive for a moment two lines holding one another in close action, one is suddenly enabled to quintuple its fire-rate, what will be the fate of the other? At times when surprise is of moment, such as counter-attacks, it is also of the utmost value. To sentries, to small bodies of men acting by themselves, such as reconnoitring parties of cavalry, the use of a repeater is of the greatest assistance.

I do not propose to occupy your time with instances of the use of these weapons, because the types which have been employed in former wars are now quite obsolete; but you are doubtless aware that they were used with considerable effect both in the American Civil War and in the Russo-Turkish. In the former it was said that one man armed with the Spencer[1] was equal to five with the ordinary muzzle-loader. In the latter the Winchester[1] did good service to the Turks, who not only armed their cavalry with it, but on occasions their infantry also for the close defence of works, as at Plevna. I propose to take it for granted that the magazine rifle is to be introduced for the reasons I have given above, and to examine briefly how we should use it.

To anticipate a little, allow me to assume that we have a weapon which holds five or more cartridges in the magazine, that the latter can be easily loaded, and that the rifle can be used as a single-loader.

Under ordinary circumstances the rules of fire discipline will remain the same as heretofore. Fire should be by volleys alone, the frequency of which will depend on the range and object, but on the offensive, the final rush should be prepared by the use of the magazine which should be reloaded the moment the position is carried. On the defensive, the magazine may be similarly employed, but possibly a little more often and earlier. For instance, at the advancing troops during their rushes, when they are so much more visible and form so much better targets than when lying down to fire. The fire during these transitory moments should be intensified because good results may be obtained from it. In fact we may say generally that either on the offensive or defensive the magazine is chiefly for the close combat, though occasionally it may be used at longer ranges. Should it ever be employed for real long-range fire? Rarely. For it would probably give rise to a great expenditure of ammunition without correspondingly adequate results. Against favourable targets which from their nature are exposed only for a short time to fire it may be made use of. For example, against masses of infantry, the staff of the enemy, cavalry, or artillery unlimbering. But it should chiefly be reserved for the decisive stage, when its proper employment may decide the issue.

Will the introduction of repeaters increase the expenditure of ammunition? To a certain extent yes. Hence it is highly desirable

[1] Specimens of both Spencer and Winchester carbines are in the Museum.

to lighten the cartridge. To this I shall allude further on. But as a practical fact the increased expenditure of ammunition is not so much due to the magazine rifle, which, if its employment where limited to one or two moments in a fight, would not greatly increase the number of rounds fired. Rather is it due to the fact to which I have before drawn your attention in this Institution, in the first instance nine years ago,[1] that having rifles of long range it would be very foolish to limit their employment to short distances. The school of fire is gradually gaining the day, to it belongs the future, and I look forward to the now not far distant day when it will be universally acknowledged in England as it is on the Continent to a great extent now, that in the proper use of long-range fire, in the adequate training of the men to pour in closely delivered showers of lead from distances up to 1,500 yards or over, lies the path to military pre-eminence. To this training the magazine rifle forms the proper complement. Armed with it the duly trained soldier possesses the power of multiplying his fire enormously at close range or increasing its volume at long ranges when necessary. Such weapons require careful training both of the Officers and men, frequent practice in their use, and careful working out of the problems they give rise to.

How are you to carry the increased number of rounds the soldier *must* have? He cannot carry beyond a certain weight, and that weight must in the future consist very largely of cartridges, his kit must be carried for him, the regimental supply of ammunition must be increased until each man at the moment of battle has 100 rounds on him, and at least 40 to 50 in the regimental supply. Is it possible under modern fire to send cartridges to the fighting line? I doubt it: far better at the last moment before entering an action serve out an additional supply fairly sufficient for the fight, and to regard sending more into the firing line as an exceptional circumstance.

So far for the tactical, and now for the technical considerations.

It is, I think, desirable that I should give you a short account of the present state of the question in European armies.

As usual, in all military reforms in the van of progress stands Germany. Immediately after the war of 1870–71 the experiments which had been begun before it broke out were again taken up and resulted in the Mauser rifle, known officially as Model 71 from the date at which the pattern was definitely decided on. This rifle now lies on the table for your inspection.[2]

A few years after endeavours were made to increase the rapidity of fire, and for a time it seemed probable that the Löwe magazine would be adopted. But its clumsiness prevented its introduction, and I feel sure when I tell you that this is the article in question, fig. 1, Plate IV, you will agree with the German military authorities.

Besides, all such contrivances are admissions of the necessity of a repeater, and must be regarded as clumsy makeshifts permissible only as temporary expedients. The question then had to be definitely

[1] See vol. xxii, p. 893, *et seq.*, "Musketry Instruction and Long Range Infantry Fire."

[2] A specimen is in the Museum.

answered—Repeater or no repeater? In Germany, as usual, common sense carried the day, and after trying various forms, the Mauser magazine rifle, which I have here, was definitely adopted. It is, I believe, now in the hands of five army corps, and before the summer the whole German Army will be furnished with it.

Its principal dimensions are given in Table A.

It can be used either as a single-loader or a magazine weapon. The magazine is placed under the barrel and holds eight cartridges, these with one in the elevator and one in the barrel make ten in all. There is nothing particularly worth drawing your attention to in the construction of the lock or magazine system. To shut off the magazine, open the breech and push the small arm *a*, figs. 1, 2, and 3, Plate III, on the left side of the rifle forward; this moves the other end of the cam of which it forms a part forward into the underneath portion of the elevator *b*, and thus fixes it so that it does not fall down when the magazine is closed.

The Mauser repeater, M. 71/84, fires the same cartridge as the Mauser rifle, M/71, but latterly experiments have been made with an improved one containing 89½ grs. of compressed powder and a steel-covered lead bullet. With this cartridge the muzzle velocity is greater, the penetration considerably more, and the trajectory much flattened, especially at close ranges. This will be seen by reference to the Table A and to Plate V, which shows the trajectory.

In France no definite solution as to the arm to be adopted has as yet been come to. It seems, however, probable that the arm will be the Lebel, which is called after the name of its inventor, a Colonel in the French Service. I am unable to give you any definite information about it beyond the fact that its calibre is 78 mm. or 0·307 in., and that the magazine under the barrel holds eight cartridges. Later on I shall deal with this question of small calibres, and will not therefore further discuss it now. For some years past, however, the French Navy has been armed with the Kropatscheck repeater, of which this is a specimen and which is shown you in fig. 4, Plate III. It differs not materially from the Mauser except in being a little more complicated, and the chief points with regard to it are given in Table A. For detailed account of the reasons which led to its introduction I will refer to an article I contributed to the Journal of the Institution some eight years since, vol. xxiv, p. 384, *et seq.*

Austria has definitely adopted the Mannlicher rifle, figs. 5, 6, Plate III. This rifle presents several peculiarities worthy of notice. In the first place the bolt is withdrawn by a straight backward motion, which renders it much quicker than one in which it is necessary to make a turn as in most bolt rifles, and hence it can be worked without taking it down from the shoulder. The cartridges are carried packed in tin frames containing five, fig. 7, which are placed in the case placed under the bolt-chamber, and whence they automatically fall when empty. The cartridges are carried packed in these frames, two being wrapped round with paper, and thus issued to the soldier. The frames weigh 385 grains each, *i.e.*, roughly the weight of a bullet, and cost less than a halfpenny to manufacture. When these cases are

TABLE A.

Name of rifle.	Weight.	Calibre.	Weight of bullet.	Powder charge.	Twist of rifling in calibres.	$\frac{d^2}{w}$.	Muzzle velocity.	No. of cartridges in magazine.	
	lbs. ozs.	in.	grs.	grs.			feet.		
Mauser	10 2	0·433	386	77	1 in 50	3·416	1,410*	Eight	* 1,571 with new Rothweiler powder.
Kropatscheck....	9 14½	0·433	386	80	1 „ 50	3·416	1,430	Seven	
Lebel	..	0·307	..	..	..	..	..	Eight	
Mannlicher.....	9 8½	0·433	371	77	1 „ 68½	3·547	1,437†	Five	† 1,575 with the new cartridge.
Jarmann.....	10 1½	0·397	337	77	1 „ 55	3·222	1,536	Eight	
Enfield-Martini ..	9 5	0·400	384	85	1 „ 37½	2·917	1,570	—	
Vitali‡.....	..	0·414	312	62	1 „ 63½	3·726	1,430	Four	‡ The Vetterli, the present arm, weighs 9 lbs. 9 ozs.
Vetterli	10 8	0·414	312	55	1 „ 63½	2·932	1,427	Eleven	
Hebler.....	9 14½	0·307	225	83	1 „ 15½	2·932	1,942	—	
Guèdes	..	0·323	264	69½	1 „ 35	2·769	1,673	Unknown	Magazine and breech action same as Kropatscheck.
Pieri	..	0·323	284	83	1 „ 36½	2·569	2,057	Five	

placed in the rifle, *e.g.*, when arranged for magazine action, it cannot be fired as a single loader, although there is no reason why more than one round should be fired. The cartridge used is the same as that employed for the Werndl rifle, the weapon hitherto in use in the Austro-Hungarian Army. Experiments are, however, being made with an improved cartridge giving a higher initial velocity.

In Italy, experiments have been conducted for some years past, and it has been finally determined to alter the Vetterli rifle, which is an ordinary form of bolt-gun, in accordance with the system known as the Vitali. A magazine is fixed in a central position under the bolt-chamber, in front of the trigger-guard, in which four cartridges packed in a special cardboard box are pushed from above. I have not been able to get a specimen of this weapon, but, so far as I am informed, it, like the Mannlicher, cannot be used as a single-loader when the cartridges are placed in the magazine. This change is avowedly only a temporary expedient pending the introduction of an improved and probably smaller bore rifle. It only costs 11 francs per piece.

Russia has, like other nations, experimented with repeating rifles, but has not yet definitely settled on a pattern. She has introduced Evans' repeater into her navy—a specimen of which system is in the museum. It is distinguished from all others by the large number of cartridges it holds, viz., thirty-five, which are placed in the butt. I do not think, however, it is likely to be introduced into the army. In the meantime, it is stated in the "Times" of the 19th February that a form of attachable magazine has been introduced for the Berdan rifle, which holds three cartridges, and which can be fitted with a metal case containing five others, or eight in all, and that this apparatus, whatever it may be, can be fixed in less than ten minutes to the rifle.

Sweden has for some time had the Jarmann rifle. I am sorry I am not able to show you a specimen of this arm with the magazine under the barrel, as in the Swedish regulation arm, but it does not possess any special peculiarities or advantages. Its action is shown in fig. 8, Plate III.

Switzerland has for some years had the Vetterli rifle, fig. 2, Plate IV, which has a rim-fire cartridge, and is scarcely now on the first rank of weapons. Portugal has recently adopted the Guèdes rifle with the Kropatscheck breech and repeating action. This rifle is distinguished from all the others I have mentioned by its small bore and high initial velocity.

It will be seen, therefore, that every nation has either definitely adopted, or is experimenting with a view to deciding on some form of magazine. We, too, have, I believe, made up our minds to follow suit, and I venture to think our authorities are to be congratulated on having determined to do so rather than to re-arm our infantry with an ordinary breech-loader, as was proposed but six months ago.

I have here, by the kindness of the Secretary of State for War, two rifles, the one known as the Lee Burton, the other as the Improved Lee. Of each of these rifles a limited number will be manufactured

and issued to the Army for trial, but no pattern of magazine rifle has as yet been definitely settled on for the future armament of our troops.

It is, of course, natural that this universal determination to change the armament of European armies should have given a great stimulus to inventors, and I suppose there is hardly a day that does not bring forth a fresh weapon. I propose, therefore, to discuss briefly the lines of progress in rifle reform, bearing in mind that what we require is a soldier's weapon, not a match rifle.

The first point to consider is what do we want our rifle to do? To shoot well and closely at ranges up to 1,500 or 2,000 yards; to have a flat trajectory within what I may describe as the decisive fighting zone, say 600 yards. These two conditions, other conditions being equal, require—

A, a high proportion of weight to area of bullet (*i.e.*, $\frac{d^2}{w}$ as near unity as possible).

B, a high muzzle velocity.

The recoil depends upon the weight of the bullet, the weight of the rifle, and the amount of powder. To fulfil A without unduly increasing recoil and maintaining B as high as possible, it is necessary to have a long light bullet, in which the proportion $\frac{d^2}{w}$ is kept low, *i.e.*, a small bore is a necessity. If we could use 500 to 600 grains of lead as is done in some match rifles, we could have a bore of 0·45 inch, but then the charge of powder necessary to obtain a flat trajectory would be so large and involve so heavy a weapon that the soldier could not use it; for the firearm must not be heavier than 9 to 9½ lbs. These facts have induced many experiments in England and also abroad with a view to ascertain whether it was possible to design one which should combine as much as possible the qualities of the express and long-range rifle. Among others who have followed out this line of research I may mention Lieutenant-Colonel Bode in Germany, Major Rubin and Professor Hebler, formerly an artillery Officer, in Switzerland. The last-named has published a work called "Das Kleinste Kaliber oder das Zukünftige Infanteriegewehr," which I can strongly recommend to the attention of all who take an interest in this subject. The two latter gentlemen have for some years carried on experiments with small-bore rifles, and both alike directed their endeavours to find out a projectile which should take the grooves well, not lead them, and yet not wear the barrel. With very long projectiles driven at high velocities through a quick twist, there is the danger that the projectile, if too soft, will strip; if too hard, will wear out the barrel. Messrs. Rubin and Hebler both determined that the best form of projectile was lead covered with a thin shell of harder metal; the former and also Colonel Bode chose copper; the latter, steel. Specimens of both kinds of bullet are on the table (see Plate V), but I believe I may fairly say that the lead covered with steel is the better of the two, and this projectile, due in its present form to Herr

Lorenz, the proprietor of the well-known ammunition manufactory in Karlsruhe, is, I think, destined to play a great part in the future. The advantages claimed for it are, that it does not lead the grooves or wear the barrel, while it takes the grooving accurately and has no tendency to strip. Moreover, it renders unnecessary the use of lubricators, and it maintains its form better in penetrating objects than does any projectile of lead. I am induced to dwell on the Lorenz compound steel-jacket bullet, because of the attention it has attracted in all foreign countries, and because I believe its use to be necessary if a really small calibre rifle is to be used. It has been largely experimented with in France; it will in all probability be introduced in the German Army; it has actually been adopted for the new Portuguese rifle. I have here a bullet which has been fired from the Hebler and one which has been fired from the Guèdes, *i.e.*, the Portuguese rifle. You will observe that in each case the thin steel jacket is not cut, but merely pressed into the lead, which I should state consists of 97 per cent. lead and 3 per cent. antimony, and is attached to the steel by a thin coat of tin. The clean close-fit surface of the steel polishes out the bore every time and removes fouling, and hence it is unnecessary to use a lubricator, and as the steel is so thin, it has not half the wearing effect of a really hard lead picket, and, as a practical fact, I may add a Hebler rifle has fired 1,500 rounds without showing the slightest degradation. Latterly the steel shells have been nickel-plated, which still further improves their shooting and does away with any liability to rust.

Here are also Martini-Henry bullets and the new Mauser bullet. With regard to the latter I may say that the compound steel projectile penetrated through two blocks of beech wood, 3½ inches thick, and eleven planks of deal, 1 inch thick, when fired with the service charge of 75 grs., whereas the old form of lead bullet barely penetrated through 3½ inches of beech.

Table B gives a few details of some experiments conducted at Enfield on the 12th July, 1886.

TABLE B.

Distinguishing letter.	Rifle.	Powder charge.	Bullet.	
			Weight.	Nature.
			grs.	
A	Enfield-Martini	85 grs. R.F.G.[2]	384	hard lead.
B	do.	do.	284	do.
C	Mauser M/71	76 grs.	386	soft lead.
D	do.	76 do.	386	do.
E	do.	89½ do. compressed	386	steel compound.

Target.	Rifle reference letter.	Penetration.
Sand	A	9·75 inches.
	B	16·5 inches.
Two beech blocks, each 3 inches thick, with deal planks behind, 1½ inches apart and 1 inch thick	A	1 block.
	B	2 blocks and 6¾ planks.
	C	1 block.
	D	2 blocks and 12 deals.
	E	do. do.

The results speak for themselves, and show clearly that the steel compound shot has a higher penetration than the others. I am of course aware that a very hard picket may be made which will penetrate as well as the steel compound bullet, but such a bullet cannot be fired out of any rifle continuously without ruining the rifling. Such projectiles must be looked on as experimental toys, and not as intended for practical use. An extensive series of experiments conducted by Dr. v. Beck, and which are fully described in his book, show that in traversing the body, whether of man or animals, it is much less liable to deformation.

Many of you will doubtless remember that in the interesting lecture given by Colonel Arbuthnot on the Enfield-Martini rifle he stated that the reason why the calibre of 0·4 had been chosen was that with smaller bores the shooting was not so regular. This view does not agree with that held on the Continent, for although Germany and Austria have kept to their present bores of 0·433 inch for reasons of economy and rapidity of transformation, because the existing barrels can be used for the new repeater, it is by no means certain that the former at any rate will not eventually adopt a smaller bore of 7 to 8 mm., while it is almost certain that France will do so. I know that in Austria economy alone prevented the adoption of a calibre of about 8 mm.

In England we are about to adopt a magazine rifle. I should, speaking for myself, like to see experiments conducted under public conditions with bores smaller than 0·4. It must not be forgotten that a Government rifle designer has not the free hand a private one has. The latter can do as he likes with regard to cartridge case, powder, and bullets. The Government official has to consult two other Departments, who may not agree in his views. To have a rifle which shall fulfil the most necessary quality in a good military arm, viz., flat trajectory, a small bore is an absolute necessity. To illustrate what I mean, look at the trajectories in Plate V. A is the old Snider, B the Martini-Henry, C the Enfield-Martini, D a rifle of 0·35 in. calibre, E and F of 0·32 and 0·30 in. respectively.

In the lowest the $\frac{d^2}{w} = 2{\cdot}093$, in the highest 4·855, and the calibres corresponding are shown in the Table C.

TABLE C.

Reference Letter.	Bullet.		$\frac{d^2}{w}$	Muzzle velocity.
	Weight.	Diameter.		
	grs.	ins.		
A	480	0·577	4·855	1,240
B	480	0·450	2·953	1,315
C	384	0·400	2·917	1,570
D	300	0·350	2·858	1,720
E	300	0·320	2·381	1,700
F	300	0·300	2·093	1,700

The highest points of the trajectories of bullets E and F for a range of 1,000 yards are: for E, 31·09; for F, 28·70.

Speaking in this Institution some seven years ago, in a lecture which I gave on "Modern Fire," I predicted that we should go to much smaller bores, and suggested 0·38 inch. I also prophesied that the repeater was the weapon of the future. I had hoped that we might have taken the lead in these advances, and not have followed respectfully in the wake of foreign nations. But I am glad to find that at last we are to have a magazine weapon, and I sincerely trust it will be the best that the most open competition can produce. The Officers selected to decide on this, the most important question of the day, will of course be chosen for their practical knowledge and their acquaintance with the subject, and I am sure we shall leave the choice with great confidence to them. It seems to me, however, that before finally deciding on the calibre further trials should be made of small-bore rifles. Personally, I think that with our present experience a rifle of 0·32 bore with a bullet weighing 336 grs., and a powder charge of about 90 to 100 grs., would be a desirable combination.

There is one objection which is usually put forward against small-bores, viz., that the bullets fired from them are much more affected by a side wind. Now, in the first place, I would point out that the wind does not always blow across the trajectory, and if it do so, and admitting that the light long bullet is more affected than a short heavy one, if this idea is to be carried to its logical conclusion it would necessitate a return to round bullets which are equally weighted on all sides. But as a practical fact, when this objection is raised a very important consideration is completely lost sight of, viz., that on the field of battle it is the mass fire of numbers, not the aimed fire of individuals, that has to be taken into consideration, and that therefore lateral deviation, considering that we aim at broad targets of little depth, is of far less moment than is flatness of trajectory. This latter is the great object to be attained in a military rifle, and is of far more importance to the soldier than lateral error, however much that may be objectionable to the match shooter. Flat

trajectory, *i.e.*, a long depth of shot-swept space, we must have, and to it we must sacrifice, if necessary, some less needed qualities in the rifle. Moreover, in these days when the good old superstition that having a long-range rifle, we should endeavour to prevent it being used until we come within the ranges at which alone the feebler weapons of our forefathers were effective is rapidly dying out, and long-range fire is now universally admitted, and infantry tactics based on its employment. Long-range fire, breech-loading rifles, magazine arms, all represent as many steps along the path of increasing expenditure of ammunition. The soldier must carry more cartridges; he can only carry a certain weight, to get more rounds of ammunition out of that weight it must be further subdivided, therefore the cartridge must weigh less, *i.e*, the bullet must weigh less, to give a flat trajectory $\frac{d^2}{w}$ must be small; in short, a small bore is the logical outcome of modern requirements in an infantry arm.

There is only one other point to which I shall allude, viz., the objection to small-bores sometimes put forward, viz., that they lack stopping power. Stopping a man depends largely on where you hit him. A kitchen poker which grazes an Arab's ribs will not stop him so well as a 50-grain bullet through his head, or through the lower half of his trunk. I wish those gentlemen who still hold these opinions would kindly look at the medical records of the Franco-German War. Let them read Sir William M'Cormac's "Work done under the Red Cross," Dr. Esmarch's work on Military Surgery, Dr. Beck's Experiments with Small-bore Bullets, and they will find that rapid moving long bullets with angular velocity enough to keep them point foremost, will, striking half way down the femur, go through and split it up into the hip-joint, involving amputation at that point. I remember when express rifles were first introduced we were told they were not as good as the old round bullet: who says so now? It may take a ton of lead to kill a man, but don't ask the soldier to fire it all at once, or the number of rounds he can carry will be very much limited.

Having determined upon the bullet, the next steps are the rifling and the powder. The question of rifling has been so fully threshed out that I need hardly allude to it. Nearly all rifles have, nowadays, broad, shallow grooves and narrow lands; fig. 1, Plate V, shows you the form employed by Professor Hebler. The rifling is, you will see, about 5000ths (exactly 0·0052 in.) of an inch deep, which is an ordinary amount. The lands are 0·0195 in. wide, the grooves six in number. Table D gives some idea of the accuracy of the weapon in question, while the diagram of trajectories shows that for 600 yards range, the ground would be practically swept from the muzzle to 650 yards.

TABLE D.

Range.		Radius of circle in feet containing half the shots.
Metres.	Yards.	
500	547	0·852
1000	1093	2·625
1500	1640	6·854
2000	2187	13·912

As to the powder. Great strides have been made in the last few years in the manufacture of gunpowder. The sharp almost detonating action of the old form has given place to slower burning compositions, which give equal velocities with less pressures. In small-bore rifles, where the number of expansions allowed to the charge owing to the great length of the barrel is large, very slow burning powders can be used. With such powders the recoil becomes more a push than a blow, and is consequently less felt. Greater charges can therefore be fired.

On the Continent a large number of experiments have been made with compressed powder, and it seems destined to come into universal use, because with it the charge can be made more uniform, and hence more uniform velocities obtained. Here is a German cartridge loaded in this manner, and Hebler and other experimenters have employed it too. Compressed powder has one great advantage, viz., it occupies less space for the same weight, and hence gives a better shaped cartridge. With regard to this latter point, viz., the form of the cartridge case, with large charges and small-bore bullets, the case becomes very "bottled;" this is clearly shown in the case of the Martini-Henry and Hebler cases, see Plate V. It seems to me that the truncated cone shape is a far better one, such as I now show, see No. 2 cartridge, Plate V, which is intended for the Enfield-Martini rifle. This case is much less likely to stick, as it has not got the long narrow neck, and, moreover, when once it is started it cannot do so, as the surfaces of the cartridge and chamber come apart. I am informed by a large manufacturer of ammunition that this form is no more difficult to make than the bottle shape.

I think, then, from what I have said, we may fairly make three deductions. First, that we should have a very much smaller bore than hitherto employed, probably between 0·36 and 0·32, but as near the latter as possible, that $\frac{d^2}{w}$ must be low to give with a relatively large powder charge a very high velocity. Secondly, we must seek

for a slow burning powder, which should be used in a compressed form. Thirdly, that we should use a conoidal cartridge.

Here let me draw your attention to the desirability of using smokeless powder. A considerable amount of attention has been given to this question on the Continent, and I need hardly point out to you the enormous advantage to be gained from it. Advancing lines would no longer be indicated by their smoke, the defenders of a position would no more be compelled to cease fire to obtain a view of the ground in front of them. I am sorry that I cannot give you details of the composition of any of these experimental forms of powder, but such matters are, as you are aware, always kept a profound secret. I am aware, however, that the French have lately been trying a white powder, which is said to have given astonishing velocities, though what it is made of I do not know.

The next point we have to consider is the magazine, *i.e.*, the reservoir from which we draw our stream of continuous fire.

All forms of magazine can, so far as their position is concerned, be divided into four classes:

1. In the butt.
2. Under the barrel.
3. Over the barrel.
4. Under the breech.

No nation has the first-named, except Russia, in the Evans repeater. The second has been adopted in France (Kropatscheck), Germany (Mauser), Switzerland (Vetterli), Sweden (Jarmann), Portugal (Kropatscheck). It has the advantage of giving room for a number of cartridges, but the very great disadvantage, which it shares with first position, of being difficult to load. Moreover, the balance of the rifle is altered each time a shot is fired. The German rifle is very faulty in this respect, and is, when the magazine is filled, an extremely awkward and ill-balanced weapon, besides being very heavy, weighing 11 lbs. Over the barrel is extremely awkward for the soldier, and in the case of those weapons which have the magazine on one side, is bad for aiming, especially when the sun is shining from the opposite side to that on which it is fixed. These three forms of rifle, viz., the Burton (see Plate XII, vol. xxvi), the Lee Burton, and the Owen Jones, fig. 3, Plate IV, have such magazines. Underneath the breech, is, on the whole, the best. The rifle is more compact and far better balanced. Its sole disadvantage is the fact that it is difficult to arrange for more than about five cartridges. These rifles, viz., the Mannlicher, figs. 5, 6, Plate III, the Schulhof, figs. 4, 5, 6, Plate V, the Pieri, and the Lee, and the Improved Lee, all have this form of magazine. All hold five cartridges except the Schulhof, which will take ten arranged round a drum like a revolver.

Should the magazine be attachable or fixed, *i.e.*, form part of the rifle? I think the latter plan to be preferable, because there is then no chance of its being lost at the moment it is wanted, and if a

number of loose magazines are to be carried, or the cartridges have to be packed in special attachable frames, the armament becomes more costly, and a lot of unnecessary weight has to be carried.

The theory, one I think essentially of peace, that the soldier can carry one or two magazines which he can affix just at the most critical moment of a combat, leaves out of consideration the disturbing elements of the fight, which would in all probability render it very problematical whether all the magazines would be forthcoming, and if they were would certainly interfere with the fixing of a large proportion of them. No great European nation proposes to adopt this system, such as you have here in the first form of the Lee rifle.

In the under-barrel forms of magazine rifles, it is not proposed to load the rifle during the heat of an action. It would be filled before going under fire, cut off from acting, and only brought into use at the supreme moment. In rifles like the Mannlicher, the Lee, the Improved Lee, the Pieri, the cartridges can be very easily replaced, and consequently a more prolonged intense fire be given than where this cannot be done, as in the under-barrel type. I may instance as a proof of this, that the five shots from the Mannlicher can be fired in $3\frac{1}{2}$ seconds, and that 46 have been fired in one minute, *i.e.*, the the frame has been six times replaced. If the magazine holds ten rounds, as in the Schulhof, the fire will undoubtedly at the supreme moment be more intense, but it cannot be kept up at the same rate as when set after set can be fired, as in such rifles as the Pieri, Mannlicher, &c. Probably, therefore, on the whole, the latter is better, but nothing but actual experiment in large numbers placed in the hands of infantry soldiers can really decide this point.

There can be no doubt that it is desirable to have a magazine holding a fairly large number of rounds, but too many would so increase the weight of the rifle as to strain the soldier far beyond his powers. This was found to be the case in some French experiments, in which the extra weight carried, owing to the cartridges in the magazine, took so much out of the men that they did not fire as effectively as those armed with a single-loader. This then is one great advantage possessed by those rifles which hold only a comparatively small number, but in which the loading of the magazine is only the work of a few seconds, such as the Mannlicher, the Pieri, and the Lee. The loading process in the Schulhof is very quick, and can be made quicker by packing the cartridges in special frames.

What action shall our rifle have? The much-abused bolt is of course a necessity, indeed of all the weapons I have here one alone, the Jones, is a block gun; shall it be one which pulls simply straight, backwards and forwards, or one which require a turn as well? I would point out that to fire without removal from the shoulder the former is a practical necessity, as with the latter form of action the aim would be too much disturbed, and the twisting motion required to open the breech is extremely difficult to carry out when keeping the rifle at the present. The Austrian (Mannlicher) and the Schulhof have bolts of this description, the Jones has a straight pull back too, all the others that I have here require the double motion. I do not

think that there can be any doubt that the one simple motion is the better.

I now propose to call your attention to the different rifles to which I have just alluded:—

The Jones rifle has a simple pullback action worked by drawbar, *a*, just behind the trigger guard. The breech action is a falling block one, and the magazine, which holds five cartridges, is on the side. Pulling back the drawbar depresses the block, ejects the exploded cartridge, pushing it forward again brings a cartridge up from the magazine into the breech. This rifle is a very quick one to work. Its chief drawback, though, of course, this is only a relative one, is the large number of parts of which the action consists.

The Schulhof presents several points worthy of attention. In the first place the cartridges are placed in a drum, *a*, in a central position, figs. 4, 5, 6, Plate IV, and are brought up one by one by the backward and forward motion of the breech bolt. The drum can be loaded with a single cartridge or any number up to the maximum it contains. The action is extremely simple, and the bolt is worked by a simple backward and forward motion. Altogether this system appears well worthy of attention and trial on a practical scale.

The Pieri is chiefly noteworthy for the arrangement by which the cartridges are fed up one by one as required, a ratchet being worked by the motion of the breech bolt, which is of the ordinary Gras construction.

The Bethel Burton has two special qualities. First of all the whole breech mechanism is carefully covered from dust; secondly, the breech bolt is locked by means of an interrupted screw, the motion of which in opening materially aids the extraction of a tight-fitting cartridge. The magazine, which is on the side, acts by gravity alone. This was described by Lieut.-Colonel Fosbery in his lecture here four years ago.

The Winchester, a tried and proved weapon which has done good service in the field, I need hardly describe. A specimen is in the Museum.

In concluding this lecture, I can only say that my endeavour has been to put before you, as fairly as I could, the present state of the rifle question, to describe the various systems now adopted, or proposed. I could not within the limits of a lecture go into a mechanical examination of all the systems that have been put forward. I have, therefore, limited myself to type forms, or to those which have actually been introduced into various Services.

The CHAIRMAN: It will be convenient if, in the discussion, we confine ourselves to the point that Captain James has brought out so strongly, namely, that what we are now trying to arrive at is the best rifle for the British soldier. The question of supplying magazine arms to our troops has been a good deal debated of late, and I hope than any gentleman who is good enough to address us will confine his remarks to what I may call the military points, and not go into purely mechanical matters of construction which we cannot follow out.

Major-General BRAY, C.B.: Mr. Chairman and gentlemen, the question whether or not we are to have repeating rifles appears to have been settled, and it is high time,

I should say in this assembly, it was settled. The Committee has been a long time over it, though I do not blame them much, because it is a very great and an extremely difficult question. We have a vast number of rifles now on hand, perhaps as many as a million, and the question that they have had to deal with has been how to manipulate and arrange so that the adoption of magazine rifles shall not cause the entire re-arming of the British Army. The same difficulty has occurred with other nations, and those rifles which we see before us are adaptations more or less of the barrels that they had on hand. With regard to the rifles themselves, I have examined nearly all the rifles that are now before us, and out of that number I have selected three as being out and out the best repeating rifles that have yet been produced. The first one I would mention is what has been called the Remington-Lee rifle. The Remington-Lee is a splendid weapon; it has a magazine underneath which contains six cartridges; it has a beautiful barrel, and is an admirable weapon, having this advantage, that the Captain of the company can control the magazine fire. Looking at the Remington-Lee you will see that the American soldier recovers the arm at the word from his Captain "Magazine load!" It is done in an instant. Then he can also give the order "Magazine unload!" So that he controls the fire of his company. Whereas if the cartridges are in the barrel of the gun, or in magazines under the entire control of the soldier, when you once get into action you will find it almost impossible to control the fire of your men. That is most important, because there are two views to take of a rifle, the accurate fire question and the military efficiency question, and they are as distinct as two things can well be one from another. The Committee now sitting on these rifles contains theoretical men and practical men; the theoretical men are all for hitting bulls'-eyes at a thousand yards; the practical men are for putting a rifle into the hands of the British soldier with which he can shoot down his enemy at distances under 400 yards; these important points must never be separated. The trajectories look very nice on paper, but to arrive at those trajectories, the rifle must be fixed in a rest, because if it is put in the hands of a soldier who is firing, the trajectory entirely depends upon the angle at which he *holds the rifle*. Therefore for mere fighting purposes you may take it for granted, and there are a great many gentlemen here who have not seen war at Wimbledon only, but all over the world, who know this perfectly well, that the real fighting of the soldier begins at 400 yards, and finishes within that distance. Now the Remington-Lee I considered an admirable weapon until I looked at it carefully. If you take the Remington-Lee No. 1, with the magazine underneath, you will find that the spring which attaches that magazine is just inside the trigger-guard, and if you touch that awkwardly or intentionally out drops the magazine between the soldier's feet, and of course that defect is fatal and kills the rifle. It has been improved, I believe, and therefore is a better rifle than when I saw it. The next rifle I selected was the Burton. All these rifles have the *bolt* action, but the Burton has this advantage that it has a closed bolt-action. It has, however, one great disadvantage, and that is that you have to fix the magazine on the side of the rifle, which is very awkward and clumsy, and though it has the very great advantage that the cartridges drop into their place by gravitation, still, I think that a magazine stuck up on the side of the rifle, either on the right or the left, is a great drawback. If Mr. Burton could get rid of that difficulty, I am certain that his rifle would be one of the finest that we have seen. I have also seen the Mauser rifle. This rifle weighs 10 lbs. 2 ozs.; it is, however, very badly balanced, and the reason that the Germans have adopted it is simply because they wanted to utilize the rifles that they had in their Army. They have, therefore, made an adaptation, and have made the best use of their rifles which they could. The Germans carry greater weight than the English soldiers, and more easily, and as a German told me the other day, no man in the German Army would object for one instant to carry the heavy Mauser. There is a great deal of difference between the weight of that rifle and that of some others that have been mentioned. I consider the most wonderful and the cleverest rifle of all is that by Herr Schulhof of Austria. The Schulhof rifle has been shown last, but I think it might have been shown first. It has got the magazine underneath, it works with the greatest facility, is admirably made, and the lock action is remarkably simple; it is a beautifully balanced rifle, though it looks

large and clumsy, and the stock is wonderfully improved; it has a grooving down the side, which catches your hand the moment you take hold of it. The wood part covers the rifle so completely that the fire-action does not hurt or heat the hand in any way. I am quite surprised that it has not taken the prize as far as the Committee has gone. Of course the Committee have looked into the matter with the greatest possible fairness and care, and I hope that they will arrive at the best rifle that has ever been introduced in Europe for the British soldier; that they will take the best parts, as they generally do, of the competing rifles put before them, and make the most perfect weapon that has ever been produced.

Colonel HOPE, V.C.: I would ask whether Captain James does not consider that if this $\frac{d^2}{w}$ were reduced still further below unity it would not be an improvement; and, secondly, whether he could favour us with a sight of any of the recent cutlasses.

Mr. C. FREDERICK LOWE, Queen's Westminster R.V.C.: Mr. Chairman and gentlemen, I will not enter into any technical question about any pattern of bolt or repeating rifle, but I think probably gallant Officers may be interested to learn the reason why for so many years our military authorities would not look at a bolt gun. I believe some twenty years ago, that while firing a primitive form of bolt rifle, an accident happened to a member of the House of Peers, and also fourteen or fifteen years ago a very awkward accident happened to a well-known shot at Wimbledon, and for those reasons the military authorities will not look at a bolt gun—"Oh, it is a bolt gun, it will not do for Her Majesty's Service;" but when nearly every foreign nation has adopted the direct mode of extraction, instead of getting at the head of the cartridge through a series of levers, common sense has at last prevailed. I heard that while a bolt rifle was being tried for rapidity, a cartridge hung fire, and exploded when partly extracted, and according to official reasoning that was a very strong argument why the bolt gun should not be used. Of course the same accident would have happened with any other description of rifle. As regards the form of cartridge, I believe the military authorities would be only too glad to shoot with the conical cartridge that Captain James has shown us, but there are difficulties in the way of manufacture. I remember that these cartridges were made by Westley Richards and Co. for Sir Henry Halford, who fired a 0·40 bore Metford rifle so chambered at Wimbledon. As regards the barrel, we have this remarkable fact, that according to the experience of the most skilled shots in the world at Wimbledon, during the last fifteen or sixteen years one system of rifling, the Metford, has come to the front, and has driven the other systems of rifling out of the field. Men are not foolish enough to pay heavy entrance fees to shoot with rifles that won't carry straight; they always go in for the rifle that gives the most bulls'-eyes. Whenever any phenomenal shooting has been done it has been with the Metford. As long ago as 1866 there was a competition at 2,000 yards with telescope rifles at Gravesend, when Mr. Metford and Sir Henry Halford between them swept the board. With a heavy Metford muzzle-loader, three or four years ago, Sir Henry Halford, firing with the Metford, 0·40 bore, with a taper cartridge before mentioned, put ten shots running into a small parallelogram at 2,000 yards, and beat the Enfield-Martini hollow at that distance. The other day, as was stated in the "Times," at 1,000 yards, Mr. Gibbs, of Bristol, put 50 consecutive shots into a 4-feet circle, and 48 of them into a 3-feet ringing bulls'-eye. Every time the bulls'-eye was hit the bell rang, and could be heard a mile off, so there could be no mistake about it. The accuracy of this shooting was certified by Sir Henry Halford in a letter to the "Times." Moreover, in 1880 some excellent shooting was done with a 0·45 bore Metford-Martini, by Major Sweeting, in the second long-range match that took place between Birmingham and London. I was witness to that, and he put 27 consecutive shots, at 800, 900, and 1,000 yards, into a parallelogram of 2 feet high by 4 feet broad. I have also been informed that the German Government, after a long series of official experiments, have come to the conclusion that the best form of grooving for a military rifle is a circular groove as shallow as possible, and no sharp corners, in short the Metford system. It is very curious indeed to find that in the face of these facts the Enfield authorities have adopted the reversed ratchet, which gives the longer slope as the

driving edge. Colonel Arbuthnot stated to me that the object of reversing the ratchet was that the bullet might be driven in against the short slope to clear out the fouling. I submitted this statement to a skilled expert, who declared that the statement was so absurdly grotesque he could not believe it was ever made. I challenge Colonel Arbuthnot, in the presence of this meeting, to give a tangible explanation for reversing the ratchet. Attention has been drawn by the gallant lecturer to the matter of smokeless powder. I beg to be allowed to mention that about a month ago I fired at 800, 900, and 1,000 yards with a Metford rifle, at Wimbledon, with fair success, and at 900 yards I put five consecutive shots into an elevation of a foot, and this was done with a smokeless powder, the invention of a German. I was told that at 300 yards the smoke was invisible; it seemed to be vapour rather than smoke, for it vanished in the air. I also have with me a specimen of the French explosive, of which we have recently heard so much, known as melinite; if you would like to see specimens of these powders flashed, I shall be happy to show you; there is not the slightest danger. I saw in last Saturday's "Engineering" a statement that the Germans, put on their mettle by the experiments of the French in blowing up a fort, had conducted some similar trials, and that the German powder had beaten the French powder. I have also got a small pinch of that, but not enough to make an exhibition of.

Major MACKINLAY, R.A.: I was glad to hear Captain James draw attention to the subject of flat trajectories, because they are most essential in enabling hits to be made, whether at a long or a short range. If the trajectories of the present rifles had been inserted in the diagrams before us, we should see that the advantage which is anticipated from the new arms is simply following in the same direction as the progress which has already been made, and the present Service rifle again has a flatter trajectory than that of a few years ago; there cannot be a doubt that greater facility of hitting any target is thus gained; in other words, the more nearly the trajectory approaches a straight line the less difficulty there is in adjusting the sight of your rifle, and errors in estimating the range become of less importance. A flat trajectory in small-arm fire at practical ranges can only be obtained by the use of a small bore. The new Enfield-Martini rifle has made some advance in diminishing the size of the bore, but there is still room for further progress in this direction. I believe fouling is apt to occur with small bores, and the suggestion of a compound bullet of lead jacketed with steel certainly appears to deserve the very greatest attention; the compressing of the powder in the cartridge also seems to be an important matter, as it enables a larger charge to be placed in the same space. In order that recoil may not be excessive the increased muzzle velocity required for the flat trajectory of a modern rifle necessitates a lighter bullet than has been previously employed; it may be said that with a bullet of less weight you would not have such stopping power as before, but in order to attain a flat trajectory you must have high velocity, and you can then afford to sacrifice weight of bullet, since the measure of the blow inflicted on striking depends on weight *and* velocity. The Enfield-Martini rifle is doubtless a great advance on what we have already, but future progress may certainly be made by increasing the muzzle velocity and further flattening the trajectory with a diminution of bore and weight of bullet, and probably an increase of the powder charge.

Colonel ARBUTHNOT, R.A.: I think, Sir, the subject to which the lecturer has drawn attention, namely, the reduction of the bore of the barrel, is one to which too much consideration cannot be given. There is no doubt, as Major Mackinlay has just said, that the Enfield-Martini is a step in the right direction; but we might go still further, and that in the direction in which we are moving will be found to be the correct one as time advances; but I do not think that we are as yet sufficiently advanced in our knowledge to jump all of a sudden to a very much smaller bore. There are other considerations besides flatness of trajectory which have to be taken into account when you come to the reduction of the bore of the rifle barrel—and of these the question of weight is no doubt one of great importance. The bore of the barrel cannot be greatly reduced without increasing its weight, because if the barrel is left of the same dimensions as at present, it must of necessity be greatly thickened, whereas if the outside diameter of the barrel is reduced it is made too weak to stand the rough usage it is likely to be subjected to; therefore in considering the

reduction of the bore you cannot eliminate the question of weight. But, apart from that, flatness of trajectory is not quite so all-important as appears by looking at the diagrams before you. It is perfectly true that with a bore 0·3 in diameter you have a trajectory at 500 yards of about 5 feet 4 inches, and with the Enfield-Martini, with a bore of 0·4, you have a trajectory at 500 yards of 6 feet 6 inches—about a foot higher. But that is not quite the way to look at it. The Enfield-Martini is sighted true for 150 yards. Firing at that range the bullet will travel 350 yards before it strikes the ground; and during the whole of that range the enemy is under fire. There is no drawing to show that, but that is the case. Now, by reducing your trajectory to 4 feet 6 inches, it will astonish many of you to hear that a bullet will only travel about 380 or 390 yards before striking the ground; so that the only gain in range is the difference between 350 and 400 yards—you only gain the range of 50 yards by the extra lowness of the trajectory. Again, another point must always be borne in mind, namely, that the height of the trajectory is very deceptive. You talk of a 4 feet 6 inch, 5 feet 6 inch, or 6 feet 6 inch trajectory: that means the height of the trajectory above the line of sight. If the man is standing up the bullet is 4 feet 6 inches from the ground at starting; therefore if you take a trajectory of 5 feet 6 inches, the bullet at its highest point is 10 feet from the ground. If the firer kneels the rifle is still 3 feet from the ground, and therefore the highest point of the trajectory will be 8 feet 6 inches from the ground, and therefore the bullet will be over a man's head for a considerable part of its flight. That is apt to be overlooked. Again, the difference in height of trajectory between barrels having bores of 0·4 and 0·3 is very immaterial. At 300 yards an infantry soldier would be covered by both; at 500 yards by neither, and, therefore, the gain from 0·45 to 0·4 is infinitely greater than the gain from 0·4 to 0·3. But I am quite prepared to admit that we shall probably come to a smaller bore, in the way we are advancing. I think the advantage of a small bore is that the weight of the ammunition can be reduced, and therefore the soldier will be able to carry more rounds than at present. In a magazine rifle that is a consideration which will have to be thought of. Not that I think the magazine rifle will necessarily bring about a larger expenditure of ammunition. I think, on the other hand, it will make the man husband his ammunition; because, now, a man loads when he sees his enemy, and fires as far off as he can in order to get as many shots into him as possible while he is advancing; but if he is certain that he will be able to fire six shots without having to reload, I think the tendency would be that he would husband his ammunition, and not begin to fire till he knew he could hit his man, and get off the six shots before the man could reach him. I think the tendency will therefore be rather to husband ammunition than to expend it. There have been many systems of magazine rifles under consideration this afternoon, but it is quite unnecessary for me to enter into any details with regard to them, seeing that Captain James has very thoroughly exhausted the subject. I think that the two systems that we are about to issue for trial will materially clear the air and enable us to arrive at a system which will be the best in Europe. We are not behind other nations at present with the exception of Germany, for no other country has adopted a magazine rifle as yet definitely; I mean they have none made; some nations have only just completed their experiments, while others are still experimenting; and no other nation, perhaps, with the exception of Switzerland, can really provide its Army with a magazine arm—always excepting Germany. I hope, therefore, we shall be quite prepared for any emergency which may happen, and ready to arm as quickly as most European countries can with a magazine rifle.

Colonel LONSDALE HALE: There is a certain class of members who attend these lectures, and who are always conspicuous by their silence; and they are the very members to whom, in this Institute, one of the objects of which is supposed to be to draw out practical information, we should most of all wish to listen. I refer to those Generals, Colonels, and other Officers who have had in the field practical experience of the fire discipline of the British soldier. It is very interesting no doubt to know whether the bolt gun is right or wrong—whether the steel-covered bullet or the copper-covered bullet is the right thing to adopt; but I do not think we care so much about that after all. The burning question for the British Army is how far we can trust the British soldier in the use of his firearm—and therefore

what form of magazine rifle, from the point of fire control, should be put into his hands. Is there any Officer here with the experience of Majuba and Egypt who would dare trust in the hands of the British soldier any one of those magazine rifles on the table? My friend Captain James has passed over in a few words the question of the "removable" magazine or the "fixed" magazine. I was under the impression that the removable magazine was the sole means by which you could control the fire of the British soldier. The Officer commanding a company could then at once see whether the magazines were on or not, and therefore for the British soldier, with his weak fire discipline, the removable magazine is the only magazine that will be full when he arrives at what tactical authorities consider the point where it must be used, at 400 or 500 yards from the object. We should be, I am sure, very grateful to any Officers present if they would give us the result of their experience, and tell us how, tactically and otherwise, they would conduct the magazine fire of the British soldier.

NOTE.—With reference to remarks made subsequently in the discussion, I may say that the supervision must, in order to be effective, be easy. Whether a bolt stopping the action of the magazine is in a particular position or not can hardly be ascertained in the heat of battle. The presence of a magazine on the rifle is discernible at a distance. The argument that removable magazines would be lost or thrown away has been applied to removable entrenching tools and removable iron rations, and yet somehow or other they are now regarded as absolute necessaries in modern war.—L. A. H.

Colonel FRASER, R.E.: I had not intended to say anything on the subject. I confess I do not agree with Colonel Hale about the removable magazine. My view is, that if you have anything in the nature of an arm in two parts, that is, to go through the contingencies of fighting, the probability is that the removable magazine will not be in its place at the critical moment; for which moment alone we are justified in sacrificing the simplicity of the single-loader. I do not think it is possible to have things too simple for war. That is the result of what I have noticed on the few occasions that I have been present in action, and I am sure that if the soldier has to fumble for the movable magazine in order to fix it on his rifle at any supreme moment, the arrangement will not work. I have seen troops with repeaters in action in the war of 1877, and I do not recollect any special difficulty as to their ammunition. Control of fire is impossible during the crisis, for the sake of which a repeater is being introduced. At other times, it does not depend on the arm, but on discipline in all ranks and on coolheadedness of race, supplemented by training. May I say how entirely I agree with Captain James, and how warmly I support him in the desire he has expressed that we should arrive at something like finality about the bore, so as to have the lightest ammunition that is thoroughly efficient. Colonel Arbuthnot has told us that we are coming presently but not now to a smaller bore than the 0·4. The 0·4 bore may be the best in the world for the present, but I think before we commit ourselves for the next 15 years definitely to that size of bore, it would be very desirable indeed that the question should be further threshed out, in view of the results already obtained with smaller bores and the evident tendency on the Continent. May I ask Captain James whether steel-covered bullets have ever been tried on the carcases of horses?

Captain JAMES: Yes, they have.

Colonel FRASER: With what result? Do they flatten or not?

Captain JAMES: They do not flatten.

Colonel FRASER: Then I do not think that they will have the effect of the lead bullet. I believe the effect of the lead bullet is due to its flattening like a mushroom, and so producing a larger wound. This expansion, and the consequent shock of the sudden stoppage of the bullet, varies with the velocity. It is slight with the Martini, considerable with the Gras and express rifles, and more so with the smaller bores yet tried, when they have still higher velocities. The destructive efficiency of very small bores is, I think, secured by this fact, and would be lost with steel-covered or very hard bullets. In the Transvaal War about 50 per cent. of our men struck with bullets died at the time or in hospital—a percentage greatly in excess of what has occurred in other wars. The percentage of wounded to

killed is usually, I believe, something like 5 to 1, but where the Boers shot with express rifles, I think about every second man struck died from the effects.

Admiral SELWYN: May I claim to say a few words on the subject of the cartridge? First, the assertion by Captain James that the flatness of trajectory, the high velocity and other qualities to which he attaches great importance cannot be obtained but in one single way, that is to say, by resorting to a small bore. Now I think on that point we have not attempted to exhaust the subject yet. On the contrary, all that we do know shows us that by the regulation of the grains of powder, of the nature of the powder, and in other ways, we can obtain a much greater velocity than has ever been attained by the use of the smallest bore, and without resorting to any other rifle or calibre than that which we possess at present. The velocity of the Martini-Henry has been raised by such means by Mr. Nordenfelt with the same weight of powder, with the same black powder, no new powder at all, from 1,350 feet per second to 1,700 feet. If that can be done, that is the direction in which we should try first to exhaust the experiments. No good progress, no sound progress, can ever be made by violating any of the first principles of physics, and you do violate one of the first principles of physics when you resort to a bullet composed of a metal of a lighter specific gravity than lead. I do not care for what reason you do so. Those reasons may disappear, but the master fact, the physical law, can never disappear and must always remain, and if you go into compromises with it, you are sure to get a result which will eventually falsify itself. We have not yet exhausted the question of fouling rifles which has brought you to that decision in some measure of the small bore: we have not yet exhausted that which was long ago brought before us so well by Captain O'Hea, taking away the rifling altogether through the greater part of the barrel. We only know that it did give us a much higher velocity and a perfectly flat trajectory at a long distance, in what was then considered an obsolete rifle. Why not carry out that experiment, which might easily be done, before you decide on a new departure? You may fire a knitting needle, if as was shown by Whitworth you increase the pitch of the rifling with a very flat trajectory and a high velocity, but the question is, what effect will it produce at long ranges, and where will it go after striking the ground? Still greater is the question, are you prepared to recommend two natures of ammunition in the field, one for machine-guns and one for the infantry rifle, or are you to fire knitting needles out of machine-guns? These things ought to be solved first, and it is therefore that questions concerning the rifle in any way whatever ought to be left aside until you have decided what projectile you would use, with what charge of what powder you will drive it, and what case you wish to put that charge and bullet in. The difference between the use of the ordinary cartridge and a long and fine projectile is, that with the long projectile you must make a long cartridge, and thereby you introduce difficulties as to the breech action required for that cartridge. You then resort to the conical cartridge, but have you settled what quantity of powder is necessary, or what is to be the nature and length of the cartridge? The cartridge should not be longer than two inches, including the powder and the bullet, and if you make it three or four inches long, you immediately get into a series of difficulties. Then, again, do you wish to have compressed powder or melinite, which I strongly suspect of being something very near an old discovery of Mr. Revelly's, which was called sugar gunpowder, made of prussiate of potash, chloride of potash and sugar, which does not give any smoke, which is white, and gives very high results, but it does give also this, which I beg you to remember, that whenever you get no smoke you are making carbonic acid, and you may also be making nitrous or hydrochloric nitrous acid, and those are the most corrosive things you can possibly put into a rifle. It will eventually, even though you may clean your rifle as thoroughly as possible, produce roughness of barrel, and you ought to look into this question long before you decide that melinite, because it produces certain effects, is therefore the best powder. I admire very much a great many of the rifles that Captain James has shown us, but at the same time I have a very strong feeling that until you have decided the question of the cartridge and the bullet, it is no use talking about the rifle. We might have to change it all, because we had a new cartridge to deal with, and we should then wish to place it in a different part of the rifle. I know that Captain

James is very much with me in my contention that you have not exhausted yet the question of getting rid of useless weights. It has been pointed out that a certain rifle weighs 11 lbs.: have you got rid of all the useless wood? What is the use of that wood? Cannot you have an equally resilient body giving equal protection from the heat developed by the firing, without a piece of wood? Is the wood a necessity? It is a very serious matter, and when you take away even 2 lbs. of it, that gives you 20 cartridges without an increased weight of rifle; 20 more cartridges carried in the arm economized from its useless weight. It is in these things that we should make real progress, and if the Committee would determine to take the first question into consideration first of all, and not the last first, I should believe that some solid progress, progress which was not likely to require repudiation, would be made; but at present we are going on in the direction which must necessarily land us in a reopening of the whole question within a very few years' time, and another expenditure of money will then be needed.

Admiral Boys: I rise to make one or two observations bearing on the naval part of this question. I believe it to be a fact that we in the Navy require a magazine or repeating rifle even more than they do in the land Services. With us it is an absolute necessity. In these days of fast torpedo-boats and ships passing each other at very high speeds, a very rapid rifle fire is most important, and it is equally important that we should have it without further delay. One great objection to magazine arms which we afloat are free from is that our supply of ammunition is ready to hand. Our small-arm magazines are so near that there is no difficulty in regard to the supply and expenditure of ammunition. Having been connected with this magazine arm question some time ago, is my excuse for offering an opinion. I would observe that the rifle I appreciate most amongst those that we have seen here is the Austrian, for the simple reason that the cartridges are supplied in a detached magazine; the firer has not to fumble about to fill a magazine, perhaps, in action, but puts the packet itself ready filled into his rifle, and when it is empty and done with, away it goes. There may be an objection to the cost, but I think the extra cost is small now, and might still be reduced. Whatever principle of magazine rifle may be approved, my recommendation would be that it should have a contrivance in which the cartridges could be stowed, supplied, and used in the rifle without having to fill another magazine from it, or to carry another article of equipment in the shape of a metal case. With reference to the stopping power of the small-bore rifle, I do not see that the argument Captain James employs is quite sound when he says that a small-bore bullet will, "striking half way down the femur, go through and split it up into the hip joint." It is all a question of comparison. If a small bullet does this at a certain distance, it is perfectly clear a heavier bullet will do the same at a considerably greater distance. May I ask one question with respect to magazine rifles? If in any rifle that Captain James is cognizant of, the action of loading is done with the left hand by a slide underneath the barrel, so that the finger is never removed from the trigger nor the eye from the sights—when, in fact, the whole operation of extracting and loading is performed by a sliding block underneath the barrel.

Captain P. H. Colomb, R.N.: I may, perhaps, usefully confirm what Admiral Boys has said in reference to the value of the magazine rifle for naval purposes, by the case of the fight between the French and German ships, the "Bouvet" and "Meteor," during the Franco-German War, in the West Indies. The two ships closed, the one endeavoured to ram, and the other to avoid the ram, and there was considerable rifle fire in the few moments of passing. Nearly the whole of the loss took place from the rifle fire at that instant. There was a thought which came into my mind when I was presiding over the Magazine Gun Committee, seven or eight years ago, and when we had the earliest forms of magazine rifles before us. That thought has been in my mind ever since, and it is very much confirmed by what the lecturer and others have stated to-day. It is that even with your rifle without the magazine your firing power is somewhat ahead of your supply powers, that you are likely to be short of ammunition as it stands, and if what the lecturer has said be the truth, in opposition to what Colonel Arbuthnot has stated, it would appear that with the magazine your firing power is going to be still more increased without, so far as I understand it, any steps being taken for increasing

your supply. It appears to me, from that consideration of things, that you must be on the eve of some still greater and more complete change than is proposed at present in rifles.

Lieutenant TUPPER: I wish to ask Captain James if he can tell us whether the Austrian soldier carries *all* his ammunition in those little tin frames. If that is the case, I think that system has a great advantage which I have not heard mentioned, namely, that the ammunition is not so likely to be lost out of the man's pouch. The rifle is loaded in a second, and any one who has had experience of skirmishing knows how difficult it is to control the loss of ammunition whenever the men lie down and rise up. They generally lose several loose cartridges from the ready pouch. It is a very great advantage to enable the soldier to retain his ammunition. If those frames were adopted it seems to me that a great deal of the waste of ammunition would be saved, as it is much easier to retain the ammunition in the frames than it is when loose in the pouch, and I hope to see that in the magazine rifle adopted for our Services some such plan for loading and for carrying the ammunition will be provided.

General DUNNE: I to a certain extent agree with what Colonel Lonsdale Hale has said. It is absolutely essential with the soldiers of the present day that there should be some power of restraining the magazine fire, and I think if they were provided with rifles with magazines, it should be with such magazines as would be in some manner stopped. I think Captain James mentioned one in which there is a stop.

Captain JAMES: The improved Lee.

Major-General DUNNE: That I think is what strikes me as the best, that is to say, it would have the effect of saving ammunition. There would be great difficulty in getting soldiers even in a sham fight to ship or unship the magazines, and there is no doubt many movable magazines would be lost; but if we could have a rifle like the one Captain James has mentioned, with a stop on it so that it can be stopped or started without being unshipped, I think that would both meet what Colonel Hale has said, and also what has been said by Colonel Fraser. I am certainly in favour of some control over the fire.

Major LESLIE: There is one matter I wish to draw attention to here, and which I shall be glad if the lecturer will kindly answer. He especially alluded to the Burton rifle, and condemned it—the inventor I see is here present; but he did not draw attention to this particular fact, which I hope he will refer to in his reply, that the Burton system is by gravitation—that is to say that the bullet falls into its place. All other systems introduce springs which are very likely to get out of order, but the Burton acts by gravitation. I think the strongest argument that can be adduced against the Burton is that it is unsightly. In warfare you only want to use the magazine when the enemy is close to you, and then the æsthetic argument is not of much consequence. It may be unsightly, but I deny that it is not efficient.

The CHAIRMAN: Ladies and gentlemen, I shall not delay you long. So far as the remarks about the mechanical part of the rifle are concerned, I agree with Admiral Selwyn that we ought to have some point from which we are to start. Do we want the rifle for accuracy of fire or for flatness of trajectory, or the bullet for lightness or deadly effect? We hear that experiments are now going on at Enfield, and Colonel Arbuthnot tells us he thinks he is on the road to reducing the bore; but it seems to me that after the breech-loading rifle has been in use so long, with all Europe trying to invent the best variety of it, we should have by this time known absolutely the best rifle, the best mode of rifling, and the best metal to make the bullet of and to cover it with. However, though we have not made our selection, the Continental Great Powers have done so; though it is likely the power of converting their respective arms into the new magazine rifle has had something to say to the choices that they have respectively made. I will therefore dismiss this part of the subject by assuming that our inventors will be successful in producing a perfect magazine arm for military purposes. We will grant the rifle as found: we will assume it is a handy well-balanced arm—not too heavy for the soldier, with a flat trajectory, properly rifled, with a bullet made of the right weight and material, and the powder right in quantity and quality; and, when we have got all these things, we have not done then half our task, for we have to provide the man to use

this perfect arm. It is of no use to put a very delicate weapon into an unskilful man's hands—and it may be really dangerous to put a magazine rifle into the hands of a man unless he has been surely trained to be sparing of his ammunition. That will be our great difficulty. One sentence of Captain James's lecture will show you the way in which these serious essentials are dismissed. He says: "In the under-barrel forms of magazine rifles, it is not proposed to load the rifle during the heat of an action. It could be filled before going under fire, cut off from acting, and only brought into use at the supreme moment." Now, gentlemen, who is to be judge of the supreme moment of a general action? There are a great many Officers here who have been in general actions often enough, but they cannot say which is the supreme moment till the latter is over. Let us picture to ourselves the private soldier with his magazine rifle: he loads it up full of cartridges, and when he sees the enemy coming at him he says, "This is my supreme moment!" and fires off the whole of his store of cartridges. Twenty minutes afterwards he might experience a supremer moment, and twenty minutes after that the supremest moment of all may come, when, with his magazine empty and nothing but his bayonet to rely upon, he may with his life pay the penalty of not having correctly recognized which was to be his supreme moment. Granting, therefore, all that Colonel Arbuthnot can do, and the War Office can do, the real difficulty we have to fight is to find men who have quick eyes, steady hands, and cool heads to use them. This morning when leaving home I happened to see lying about a lecture which I had the honour of delivering on the 12th of April, 1878, in this hall: it was on the breech-loader, and in the first paragraph of that lecture I defined the two principal points for consideration connected with the breech-loader as—"The formidable properties of the arm in attack and defence," and "The helplessness of the arm when short of ammunition." *How are we going to teach the soldier to husband his ammunition?* It can only be done (1) by impressing into him the conviction that with a magazine rifle, plenty of ammunition, and a cool head he is absolutely unapproachable; (2) by making him responsible at the field-days of peace service, that however hot the fire, he must always have ten, or certainly five rounds in his possession, and, if possible, his magazine full; and when he has been so trained, morally as to realize his power, and physically that he husbands his ammunition, there will be no danger in putting a magazine arm in his hands, and he will be fit to use it. Commanding Officers, Adjutants, and Captains must teach the soldier that he must expend his rounds as he does his shillings, and be careful of them. I do not think anybody can conceive a more pitiable case than would be presented by two opposing lines in presence of each other; one line being short of ammunition, and the other line having their magazines full. Therefore, by whatever means it is done in this country, it is absolutely necessary that when the private soldier is enlisted the first object should be to train him to shoot, and the second should be to teach him to economize his rounds, as the most valuable possession he has; because I am perfectly certain there can be no greater danger to the British Army than to allow our men to go into action without that kind of training being previously assured to them. We must recollect the men we get into the ranks are not like the men that Continental nations get by conscription, two out of every three of whom are educated men. These are not the material we get for our Army; therefore we must make our training such as to meet that danger; and even when our men are so trained the action may nevertheless be so long, or the fire so hot, that pouches and magazine are alike in danger of exhaustion, and we must arrange to provide a fresh supply of cartridges. For this purpose in our Service we have a reserve ammunition cart attached to the battalion; and I think we should on every occasion make use of that cart either by issuing a small supply of blank ammunition to men, or by engaging battalions for a considerable time so as to test our system for supplying this ammunition to the troops. I think it would be a very great advantage if on every field-day at Aldershot one or more battalions should run out of their ammunition simply in order to see that our arrangements for supplying fresh ammunition are efficient. The ammunition cart must be made constant use of if we issue this new rifle. It is not given to the troops because we want a quicker shooting rifle than the breech-loader: it is only given for the moral effect, because it would not answer our purpose to send our troops armed with our present rifle

against a civilized enemy. With magazine arms our soldiers would have a kind of moral feeling that they were armed as well as the enemy, and this might qualify their value as soldiers. Therefore as it has been decided to issue magazine rifles, we have to train the men in peace-time, so that when they go into action they shall keep their heads cool and shall feel that with the best rifle and plenty of ammunition nothing can come near them. If the British soldier can only be trained to feel that, he will be careful with his cartridges. I think the question of ammunition carts has not been half enough considered ,and it is a question whether making the party in charge of the reserve ammunition cart responsible that it communicates with any part of the battalions heavily engaged as to their requirements in respect of ammunition, might not provide a double security against this greater danger that the issue of the magazine arm may introduce.

Captain JAMES, in reply, said : I will deal first of all with General Bray's remarks. The Remington-Lee does not hold six rounds, but only five. Then he discussed the question about practical and theoretical men, and he was of opinion that practical men would reserve their fire till 400 yards. There were practical men, I believe, at the battle of Gravelotte. The fire from St. Privat certainly ranged over 2,000 yards, and killed a very fair number of Prussians at that range. Therefore, I think it would be difficult in like circumstances to reserve your fire till you get within 400 yards. The Mauser rifle I have shown you this afternoon is an entirely new arm, a new barrel, and a new arm altogether. The old arms have not been altered into the Mauser repeater; new arms entirely have been manufactured. General Bray thinks I should put the Schulhof first. I am perfectly aware of the many advantages of the Schulhof; it is an exceedingly good rifle, but I carefully stated at the beginning of my lecture I did not propose to absolutely advocate any particular weapon, and I think you will agree with me that was the best position for me as lecturer to take up. Had I come down here as an advocate of any special or particular form of weapon, you would very justly have said "Captain James has come here not to give us a lecture on the general question but to forward the particular weapon of some special inventor." I scarcely think that would be becoming in my position, as one who proposed to deal generally with the subject; therefore, whatever may be my own personal opinion of the Schulhof I should feel it wrong to have come down here to advocate that to the exclusion of any other. Colonel Hope asked me about the $\frac{d^2}{w}$, whether that could not be reduced to one. I should like to see it reduced even lower were it possible, but if you get it much lower than two, the difficulty becomes so great of using it in the rifle, because you get such an enormously long projectile. With regard to the rifling, I may say rifles are now being made at Enfield with the Enfield-Martini bore—0·4, rifled on the Metford system. There is also a new form of rifling which gives very good results indeed, in fact, so far as the results show, this form is as good as the Metford. Now I will deal with one or two points that Colonel Arbuthnot alluded to. Colonel Arbuthnot's position is this: "A small-bore! Yes. I believe we are going in the direction of a very much smaller bore, but I do not want to go there yet." That is just where I differ from him. I want to get to a final position as soon as we can. I said in a letter I wrote to the "Times" some months ago on this question, that I had sufficient knowledge of the Chancellor of the Exchequer to be quite sure that if we screw out of him the money for the new armament of the British soldier, we are not likely to get a similar sum every two or three years; hence when we settle on our rifle let us for goodness' sake go as far as we can along what is evidently the path of progress. Now as to the height of the trajectory, of course everybody knows the heights are measured from the straight line along which they are plotted, over the horizontal line. But Colonel Arbuthnot omitted one point, namely, that a large proportion of the firing would be delivered when the men were lying down, and consequently if you aim at the feet of the object, as the German soldier is habitually taught to do, the trajectory is very much more like that (pointing) than it would be if the rifle were held absolutely horizontal; and hence the real results more nearly approximate to that—I allude to figures—than Colonel Arbuthnot implied. Moreover, there is another point. Experiment shows distinctly, and I am perfectly sure anybody who has ever seen any firing knows it to be the case, when troops fire a volley the

ground is struck very often fairly close to the rifle, and the bullets go on pretty close to the ground up to a distance beyond the object aimed at. When you get a very flat shooting rifle what you do is you sweep the ground up to long ranges. It is perfectly possible to construct a rifle that shall, for practical soldier purposes, only want one sight up to 700 yards; that is to say, that you shall sweep the ground up to about 700 yards. Allowing for differences in aim, which is a practical thing which is first of all worked out by the Germans in long-range rifle experiments, you will find that with these differences in aim the ground is with a flat trajectory rifle swept for a very long distance, almost from the muzzle of the rifle, and that is why the flat trajectory is such a very great object to the soldier; because, practically, taking into consideration how soldiers do actually fire, and the variable aims that they have, you do get the ground so thoroughly well swept up to long ranges with a flat trajectory rifle. Colonel Hale spoke in favour of removable magazines. Colonel Hale and I are very old friends, though we have before differed here on tactical subjects, so that I am really not surprised to find he again differs from me, as he does from most lecturers in this Institution. The detachable magazine has been tried in America, and it was found the next day that a large number of detachable magazines had been left behind. The result would be that often when the soldier, even a highly-trained man, calm and capable of attaching the magazine, was required to do so he would be in this unfortunate position—that he had not got it. Like the French Admiral who said he had a hundred reasons why he could not fire a salute, the first being that he had not any powder, so would it be with the soldier in the case of the detachable magazine, he would have detached it once for all, and he would not be able to use it when the proper moment came. Detachable magazines may be lost, and when it is the weapon is no longer a repeater. Moreover, how is the Officer practically to ascertain under fire whether the soldier has affixed his magazine or not? Such theoretically fine distinctions savour much more of the study than of practical experience of war. Be certain of one thing, there will come a time in every fight when no power will be able to prevent the soldier using his magazine, whether fixed or detachable, and do not attempt to introduce an inefficient weapon simply for an illusory and theoretical advantage. How can you tell in action when one out of ten soldiers has fixed his magazine? You cannot even be certain at target practice of the exact number of rounds each man fires in open order, much less can you under heavy fire when all your energies are taken in watching your men, in looking to the effect of your fire, in observing the movements of the enemy, afford to devote your attention to ascertaining whether each individual Tommy Atkins has or has not attached something to the underneath portion of his rifle. Admiral Selwyn stated what I believe to be the right way of regarding a rifle. In making a rifle what have you to deal with? First of all you have to deal with the bullet. Let us start with what the bullet is. What do you want it to do? To give a flat trajectory. You want, therefore, a high velocity. Then see what powder you require to obtain this, what sort of case you are to put it in. What rifling do you want for the barrel, and then, lastly, comes the breech and the magazine. Admiral Selwyn says you cannot have a cartridge-case with a bullet so that the two together are longer than 2 inches. Now I must point out to the audience that the whole of Europe is on the other side; personally, I am on the side of Europe. Admiral Selwyn also says you violate a physical law by using another metal than lead for the bullets. I am prepared to violate all Admiral Selwyn's so-called laws, but which we must remember are only his personal views about the laws, if I get what I consider a better bullet. I must draw attention to another point. He stated that if you use certain powder you will injure your rifle very much. That is perfectly true, but it does not follow that the white powder would produce nitrous acid. It does not follow that there are any nitrates in the composition. There may be chlorates, but it would be an extraordinary chemical process to make nitrates out of chlorates. Major Leslie objected to my remarks about the Burton rifle, and said as far as he understood what I had said that I did not like the Burton rifle because it did not please my æsthetic feelings. Well, I candidly admit I am very æsthetic. I admire everything that is beautiful in nature and in art, whether it be in the surrounding scenery or even in the magazine rifle. But I venture to draw attention to this point, that I never used the word æsthetic,

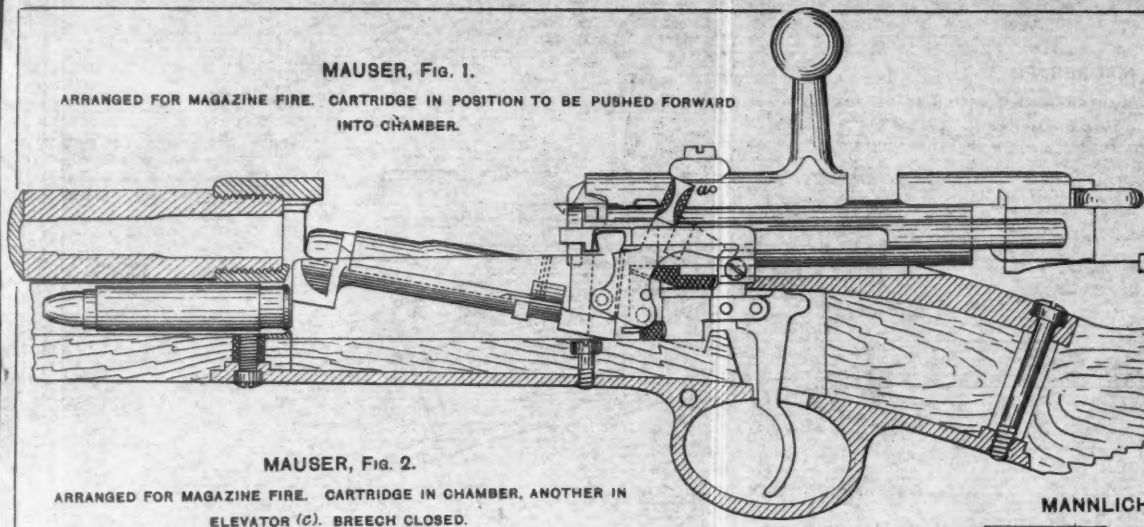
and I never said anything in my lecture which would lead anybody who I think brings an unbiased judgment to bear upon the subject to believe that I objected to the Burton rifle because it was not beautiful in form. If it is a rifle that suited our requirements I should be the first person to advocate its adoption. I stated that I did not advocate any particular form. I say once more, a magazine on the side is not as well suited for the soldier as a magazine underneath. I think the Burton in many respects an admirable rifle, but I do think the arrangement of the magazine on the side is not as good for the soldier as it is when underneath. I decline to enter into any argument as to mechanical arrangement, because I do not think a lecture theatre is the proper place for it. I can only once more say, I do not think it is so good as other forms of magazine, but I certainly did not condemn it in strong terms, because I believe I spoke in the most guarded manner about it. Admiral Boys asked me if I was aware of any form of magazine rifle which worked by means of the left hand, so that the right hand did not get taken away from the trigger. There is a form of rifle for a small cartridge, but when you come to a long cartridge, as you must have, it is quite impossible to use that system because the travel of the left arm would be so great. Lieutenant Tupper asked me whether the ammunition of the Austrian rifle is always kept in these cases. Yes, it is. As I stated, it is served out to the soldier in two cases put together and wrapped round with paper. That is the way that the ten rounds are issued to the Austrian soldier, so that he always has his cartridges in a form out of which they cannot easily tumble. And now one word about what Major-General Clive said in his remarks. I am perfectly certain of this, that whatever system of rifle you have, whether a magazine or an ordinary breech-loading rifle, it is no good having the most perfect one in the world unless the men into whose hands you place it are themselves properly trained. I do venture to say one thing most distinctly, and I am perfectly certain a large number of Officers in this theatre must agree with me, that the present practical training of the British infantry soldier is by no means on an equal footing with that of the foreign soldier, and it has by no means reached the level which it must reach if the British soldier is to go into the field as thoroughly conversant with his duties and as able to carry them out as is at the present moment the German. General Clive mentioned one point on which I personally have a very strong feeling: he said the Colonels and Adjutants, and Captains must look to the training; but he must go one step lower, he must go to the Lieutenants. Every single Officer who leads his men into action must fully know beforehand what is required of him. He must have that training which practice in peace under conditions of war alone can give, and for anyone to imagine that troops who may be excellent at marching past, who may drill like a stone wall, are tactically fit to meet a properly trained foe, is a delusion which will only be done away with at the price of defeat and slaughter on the battle-field. This is a question to which the attention of all the higher authorities in the Army must be called. It is useless for us to imagine at the present moment that our troops as they are are fit to meet any foreign foe, because they are not trained on any system equal to that of the French, German, Austrian, or Russian, in fact, not equal to the system of any nation who practically knows what war means.

Major-General DUNNE: The lecturer having the last word, it is impossible for me now to reply to the unexpected remarks on the want of proper training amongst our men, but coming from our principal School of Instruction at Aldershot, I must protest against much that has been said against the way we prepare our troops for war, and I beg this meeting to believe that we are not a quarter as bad as we have been painted. (Applause.)

A vote of thanks to Captain James for his interesting lecture was then carried unanimously.

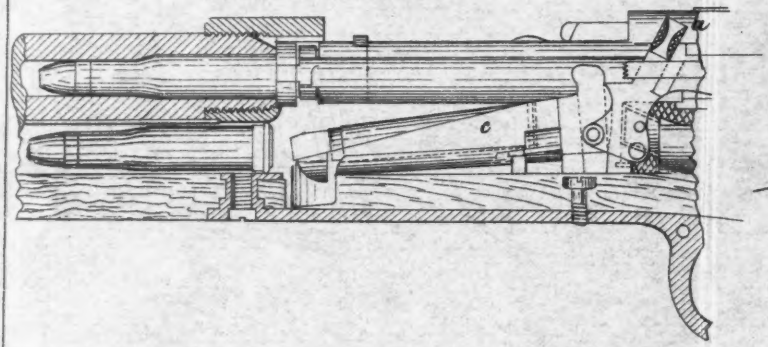
MAUSER, Fig. 1.

ARRANGED FOR MAGAZINE FIRE. CARTRIDGE IN POSITION TO BE PUSHED FORWARD INTO CHAMBER.



MAUSER, Fig. 2.

ARRANGED FOR MAGAZINE FIRE. CARTRIDGE IN CHAMBER, ANOTHER IN ELEVATOR (*c*). BREECH CLOSED.



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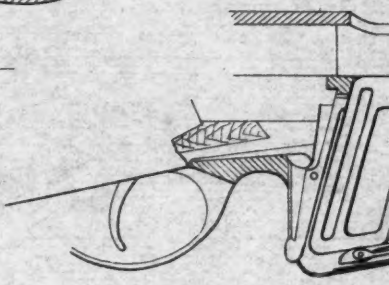
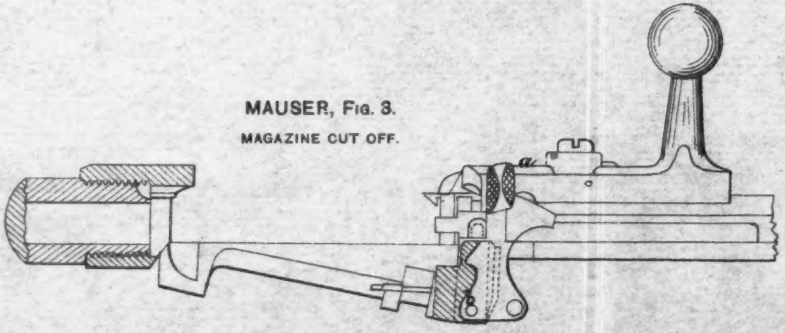
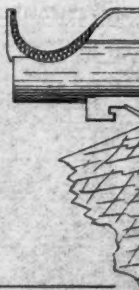


MAUSER, Fig. 3.

MAGAZINE CUT OFF.





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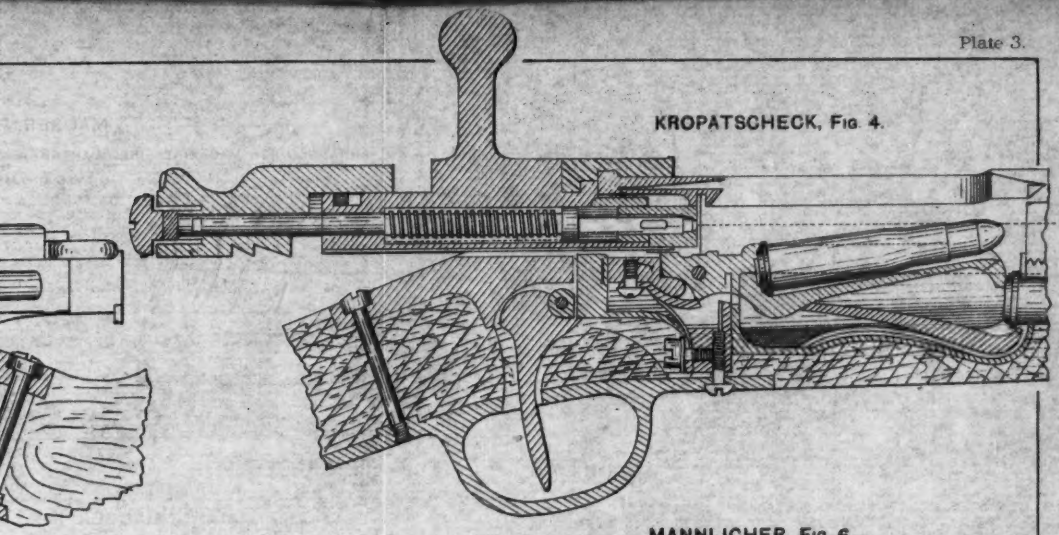
KROPATSCHECK, Fig. 4.



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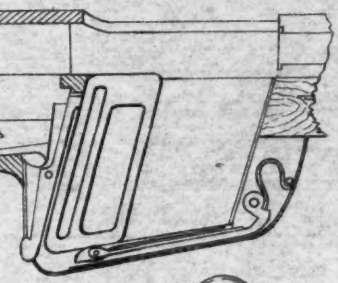


MANNLICHER, Fig. 6.

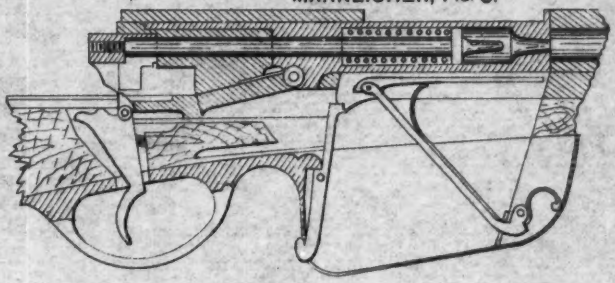
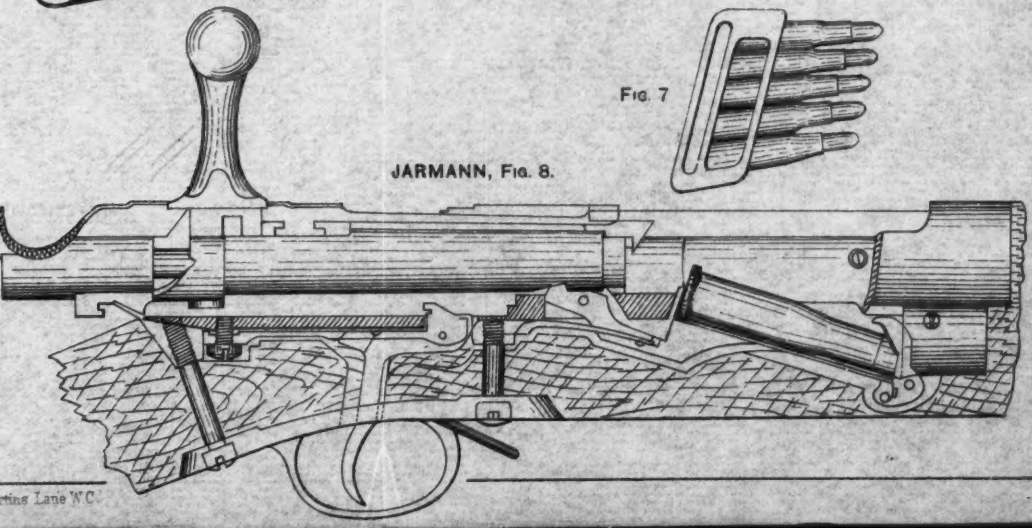
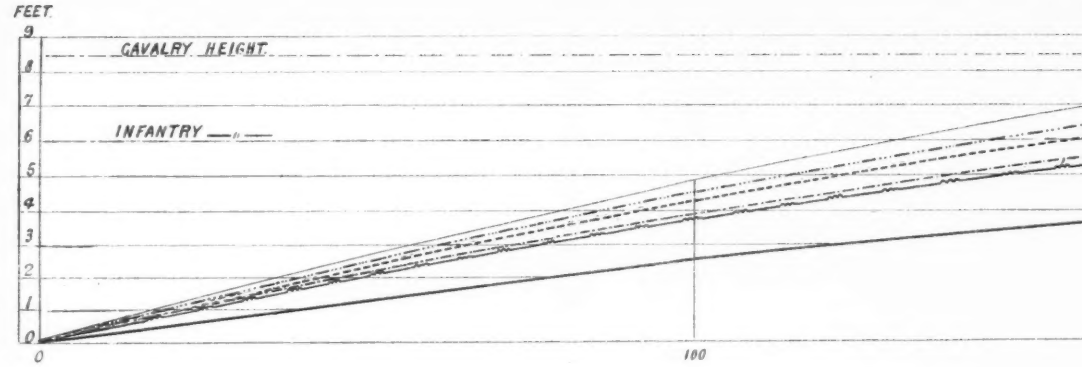


Fig. 7

JARMANN, Fig. 8.

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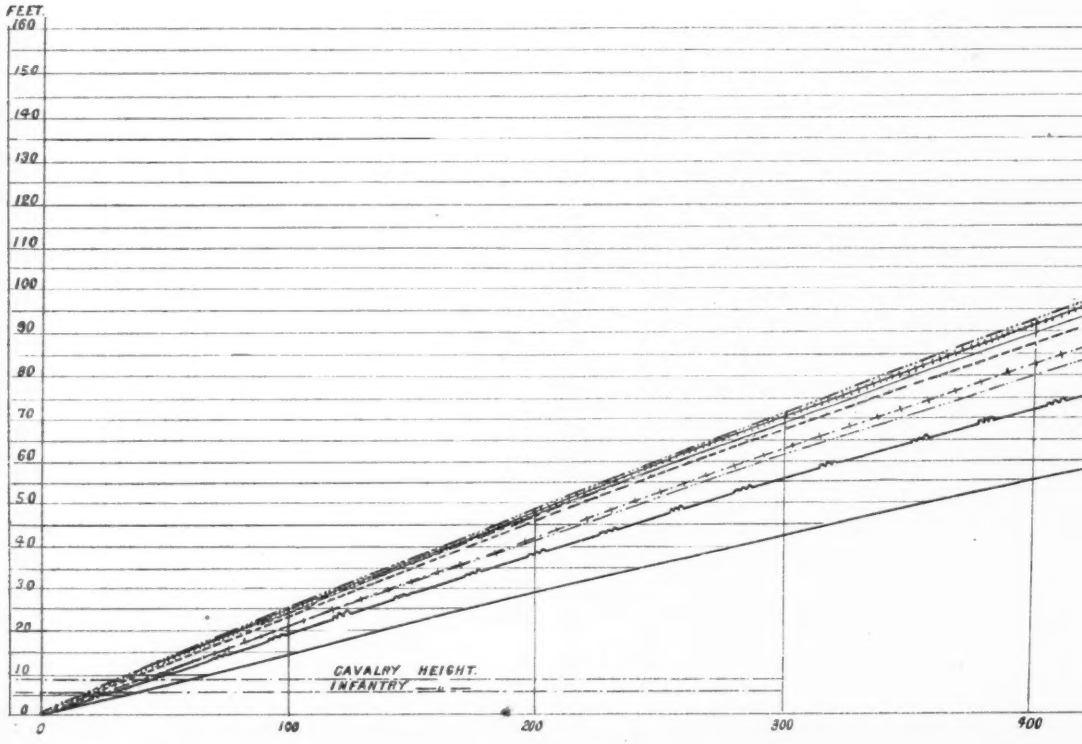
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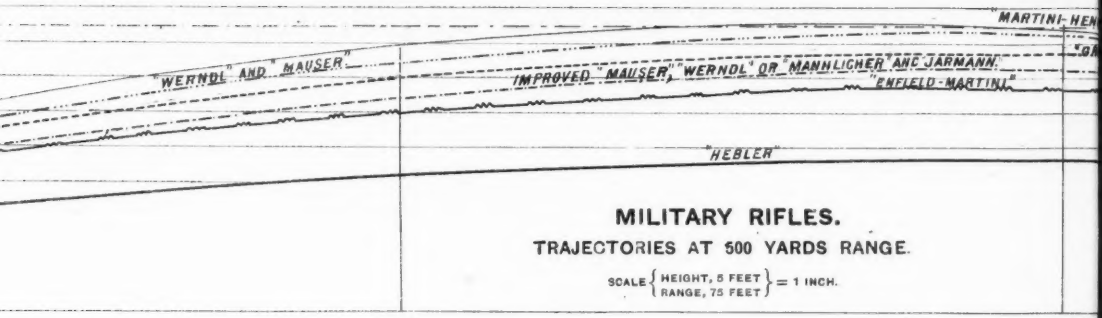

MILITARY RIFLES.

TRAJECTORIES AT 500 YARDS RANGE.

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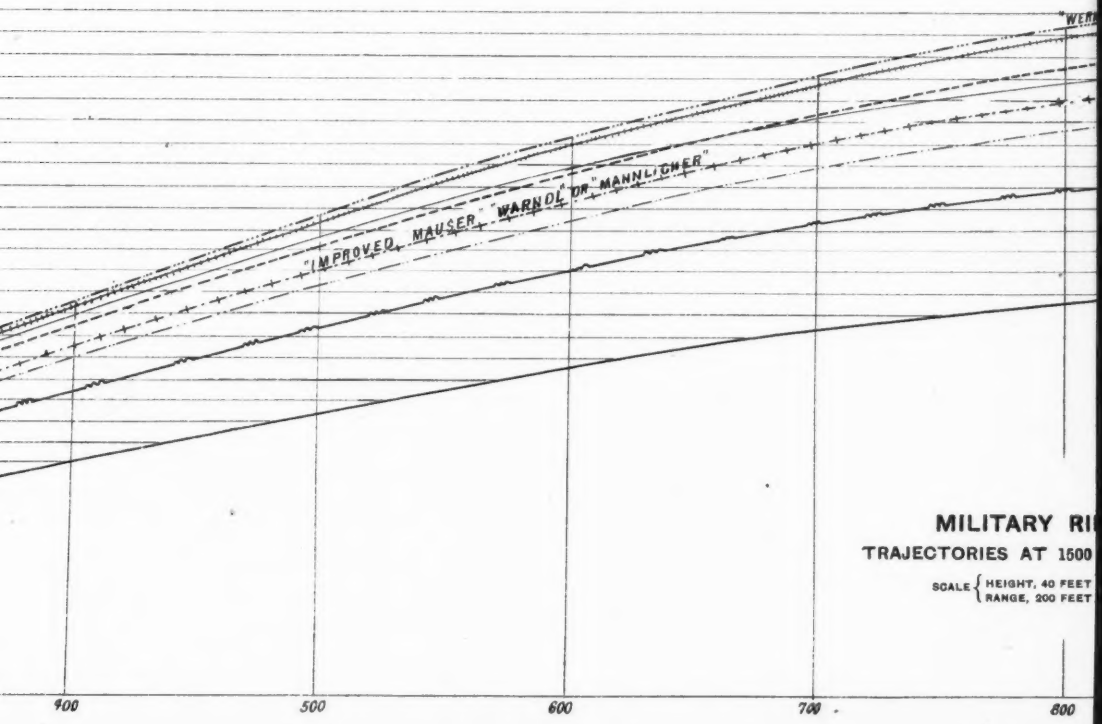

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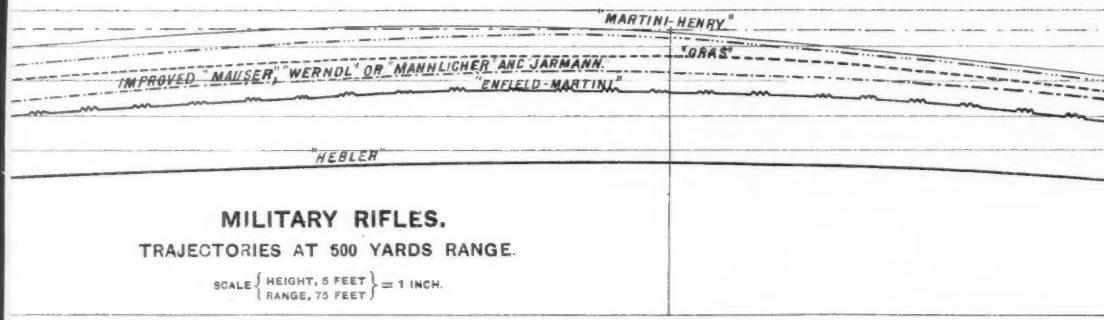

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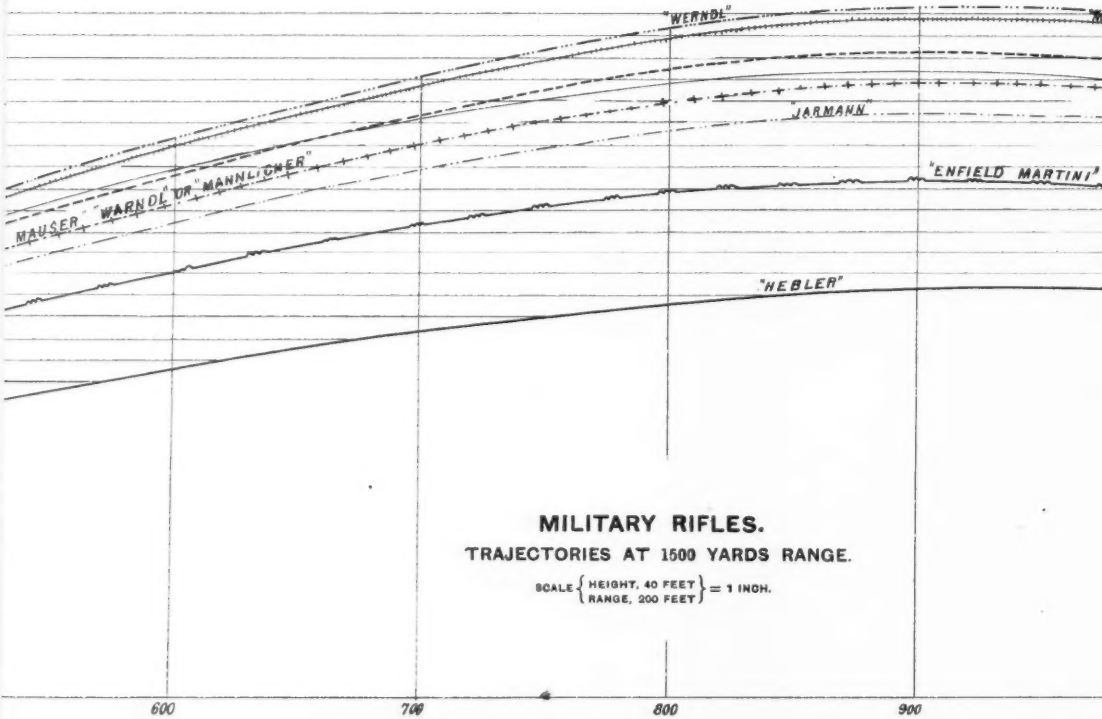

MILITARY RIFLES.

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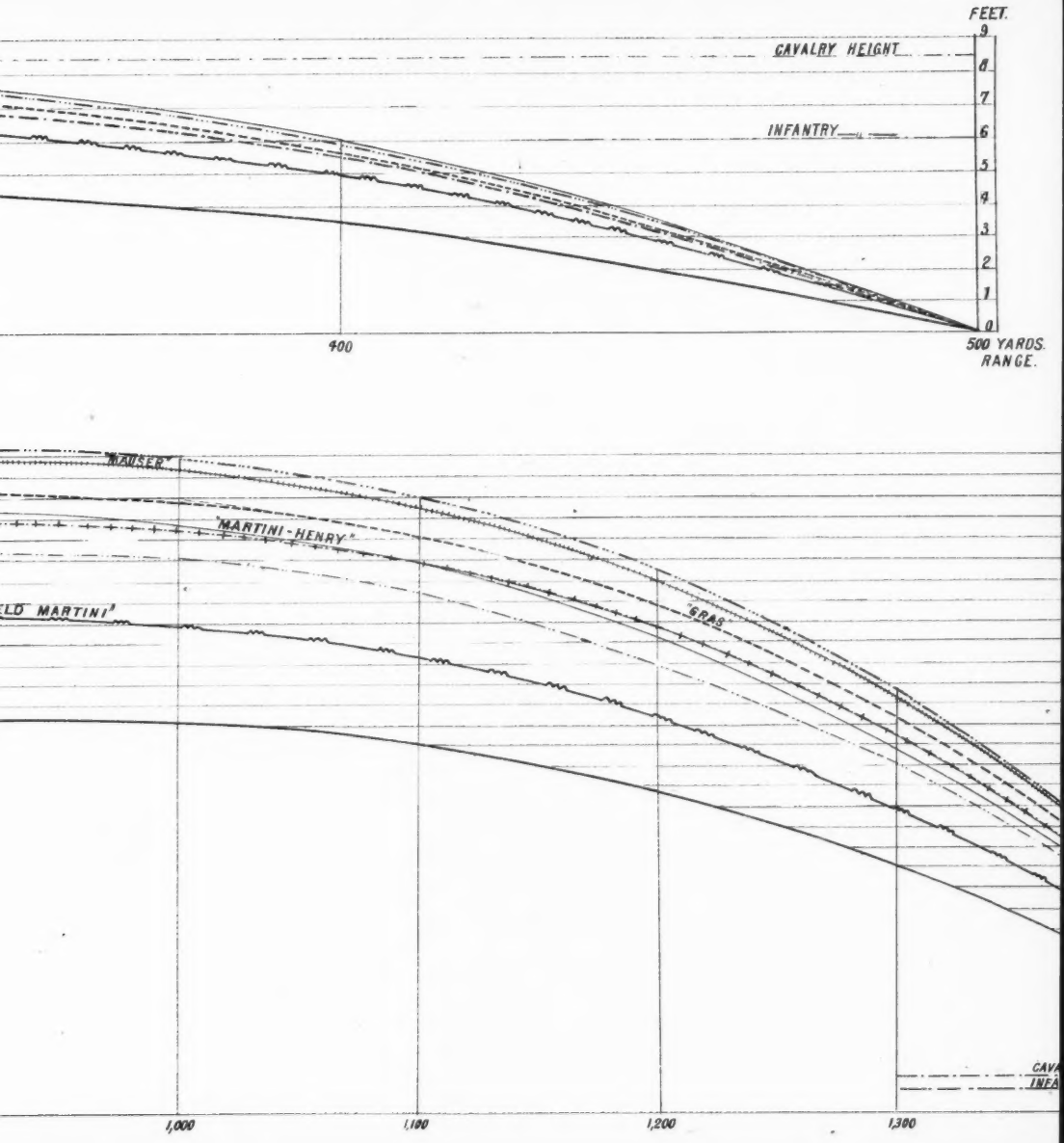
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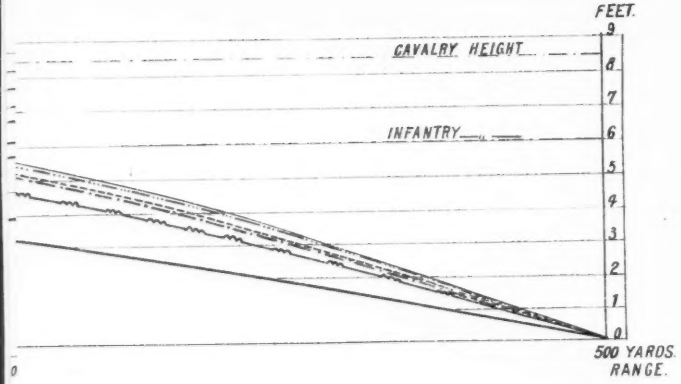
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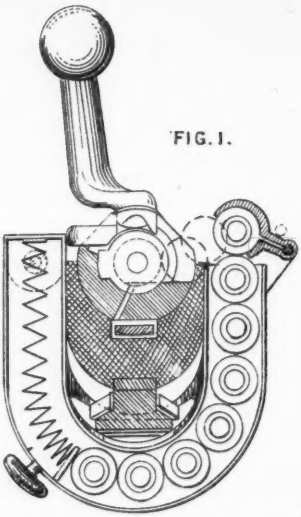
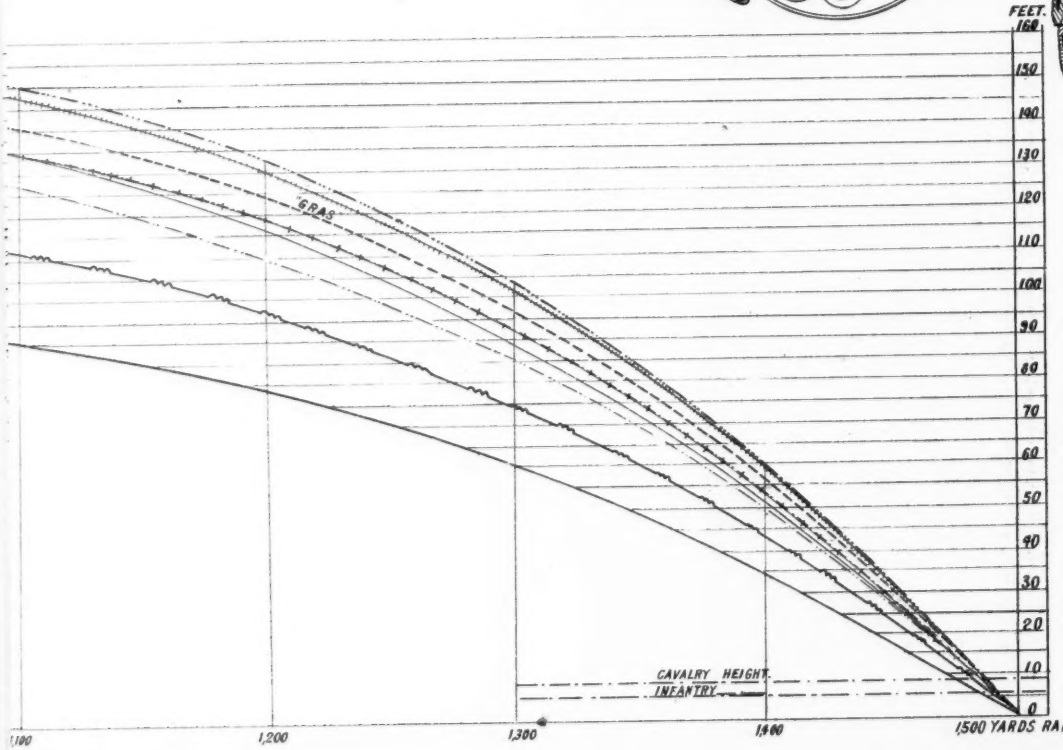
FIG. I.

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30
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0
GRAS
CAVALRY HEIGHT.
INFANTRY
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1,300
1,400
1,500 YARDS. RA

FIG. 2. "VETTERLI."

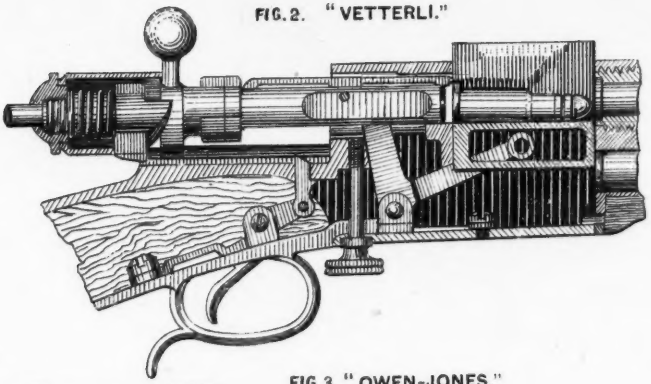


FIG. 3. "OWEN-JONES."

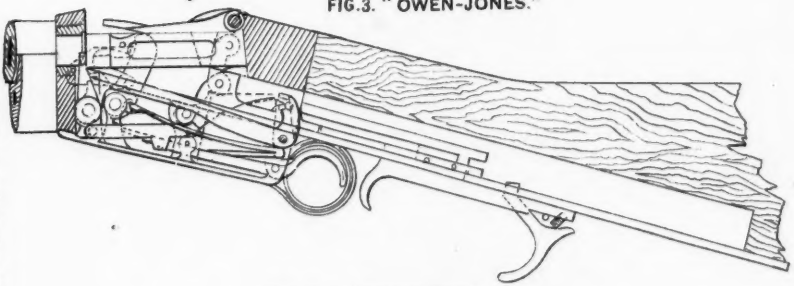


FIG. 4. "SCHULHOF."

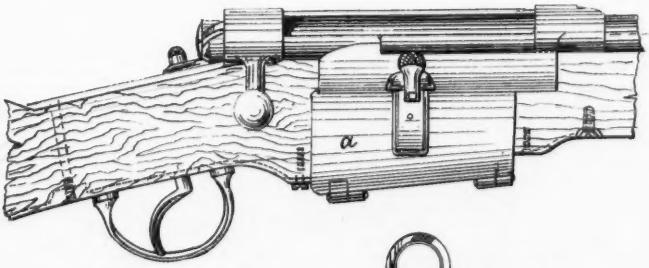


FIG. 5.

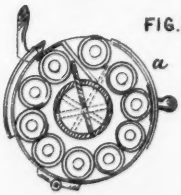
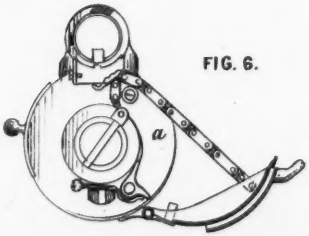
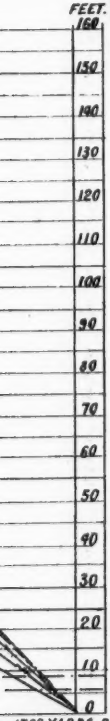
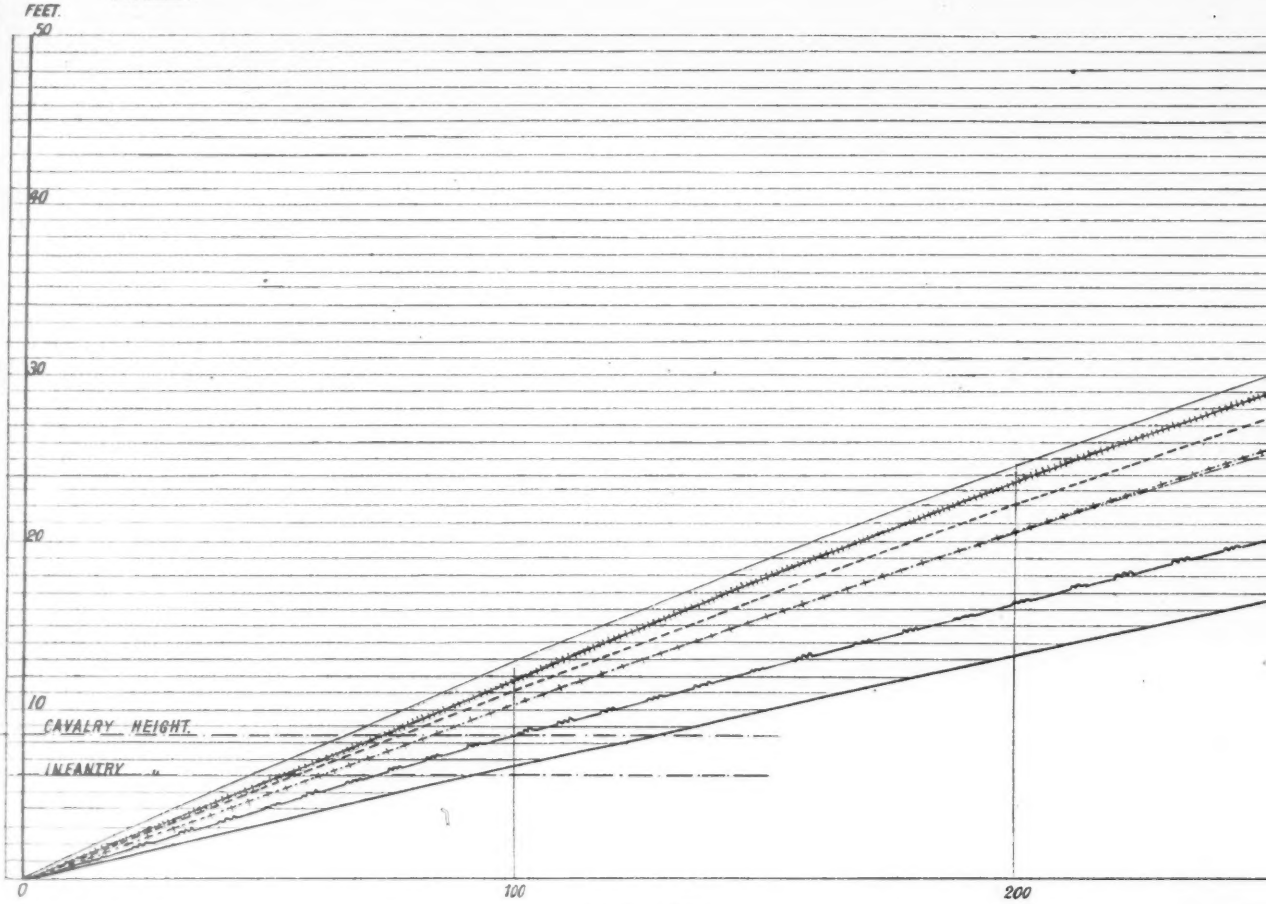


FIG. 6.







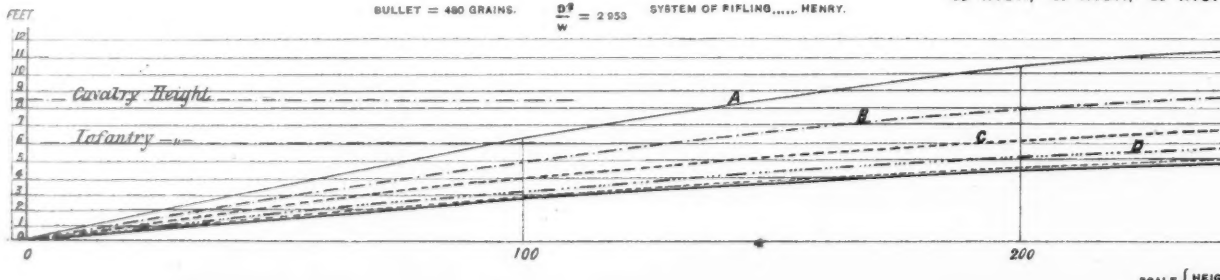
0·45 INCH BORE.

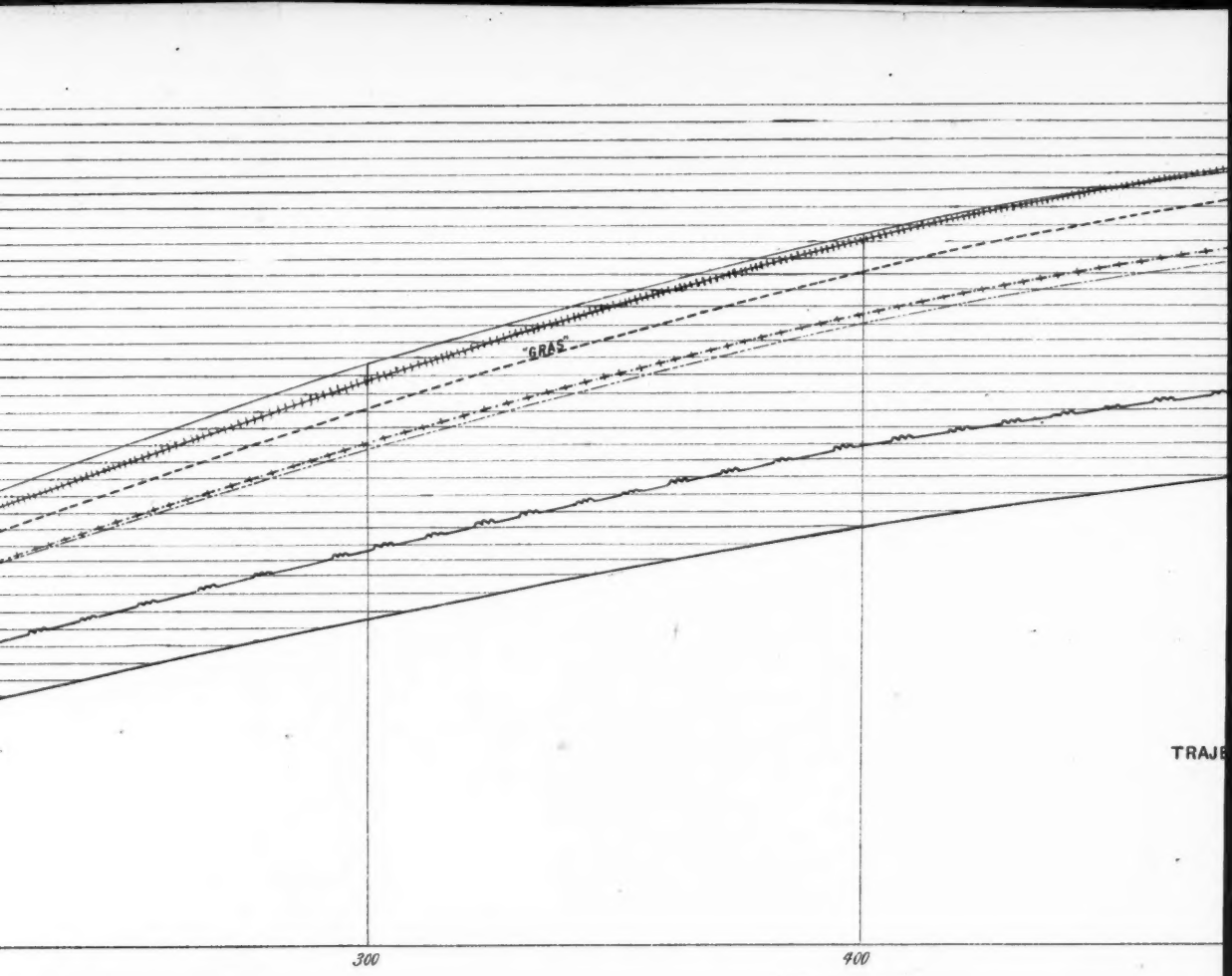
POWDER = 85 GRAINS. MUZZLE VELOCITY = 1315 FEET PER SECOND.

BULLET = 480 GRAINS. $\frac{D^2}{W} = 2.953$ SYSTEM OF RIFLING..... HENRY.

" TRAJECT

35 INCH, '40 INCH, '45 INCH





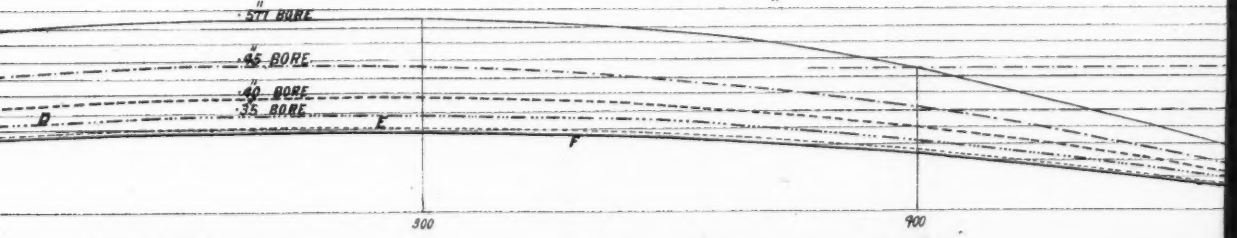
"TRAJECTORIES" RIFLE.

NCH, ·45 INCH, AND ·577 INCH BORE OF BARREL.

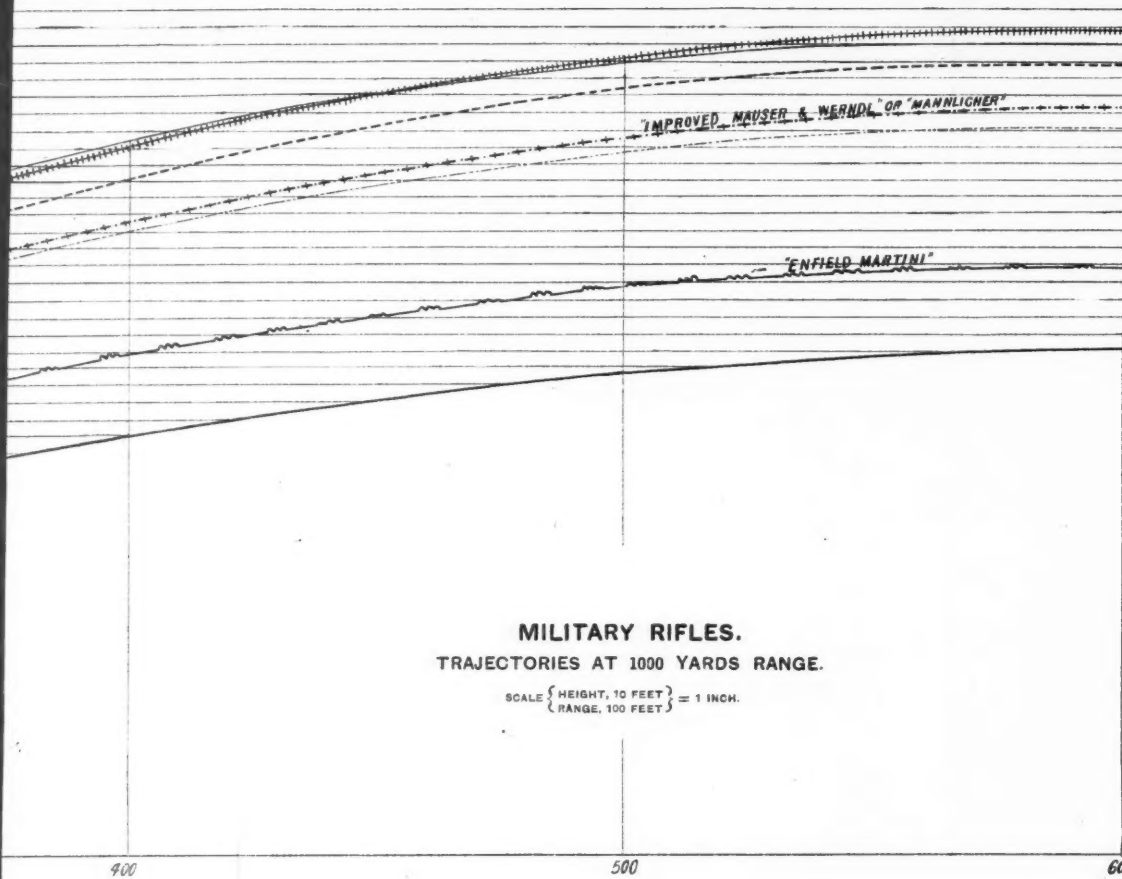
0·577 INCH BORE

POWDER = 70 GRAINS. MUZZLE VELOCITY = 1240 FEET PER SECOND.

BULLET = 480 GRAINS. $\frac{D^2}{W}$ = 4·855 SYSTEM OF RIFLING.....ENFIELD.



SCALE { HEIGHT, 1 INCH / RANGE, ·01 INCH } = 1 FOOT.



MILITARY RIFLES.

TRAJECTORIES AT 1000 YARDS RANGE.

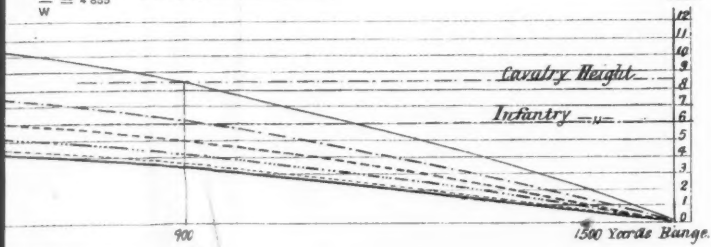
SCALE { HEIGHT, 10 FEET / RANGE, 100 FEET } = 1 INCH.

900 500 60

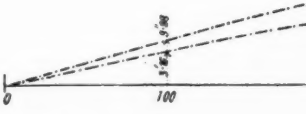
0·577 INCH BORE

MUZZLE VELOCITY = 1240 FEET PER SECOND.

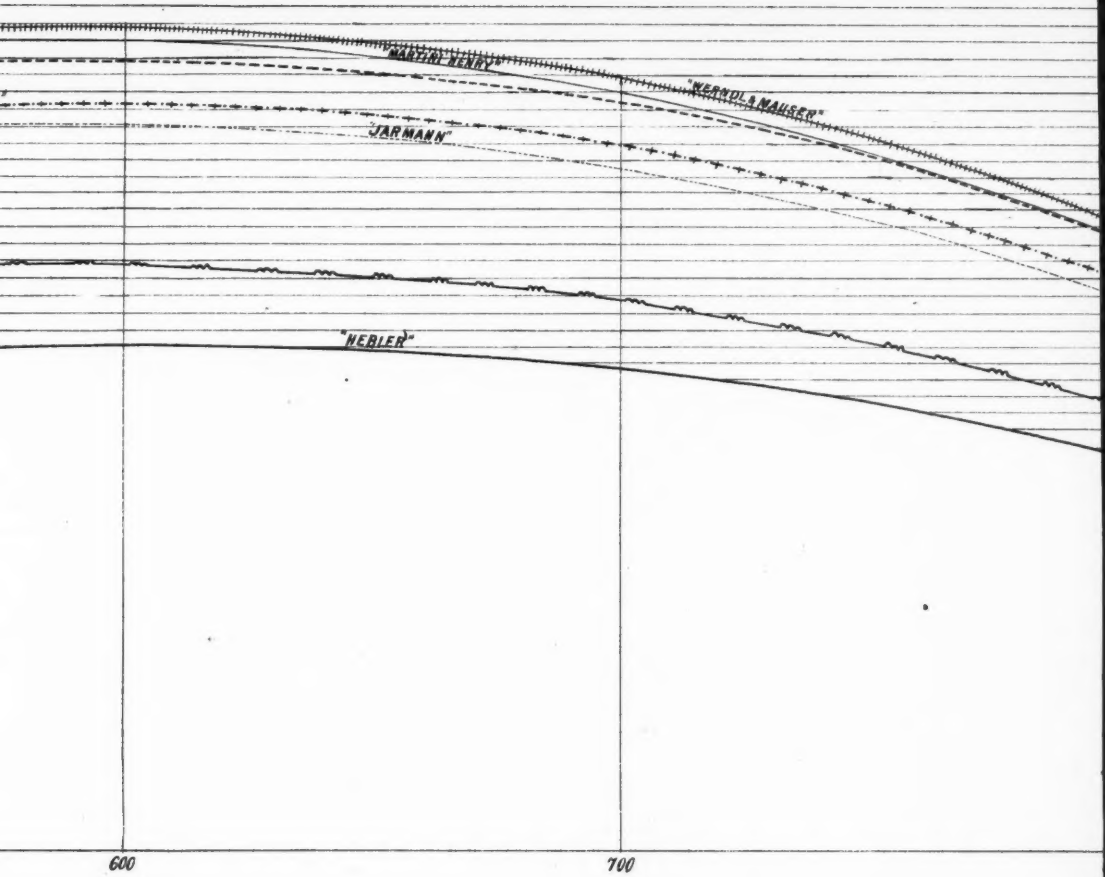
$\frac{D^2}{W}$ = 4·855 SYSTEM OF RIFLING.....ENFIELD



TRAJECTORIES AT 600 AND



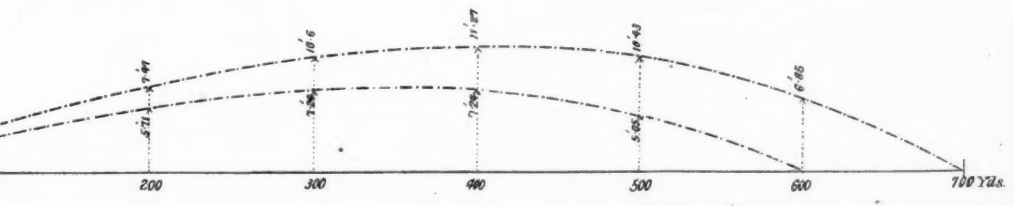
Harrison & Sons Lith. St Martins Lane. W.C.

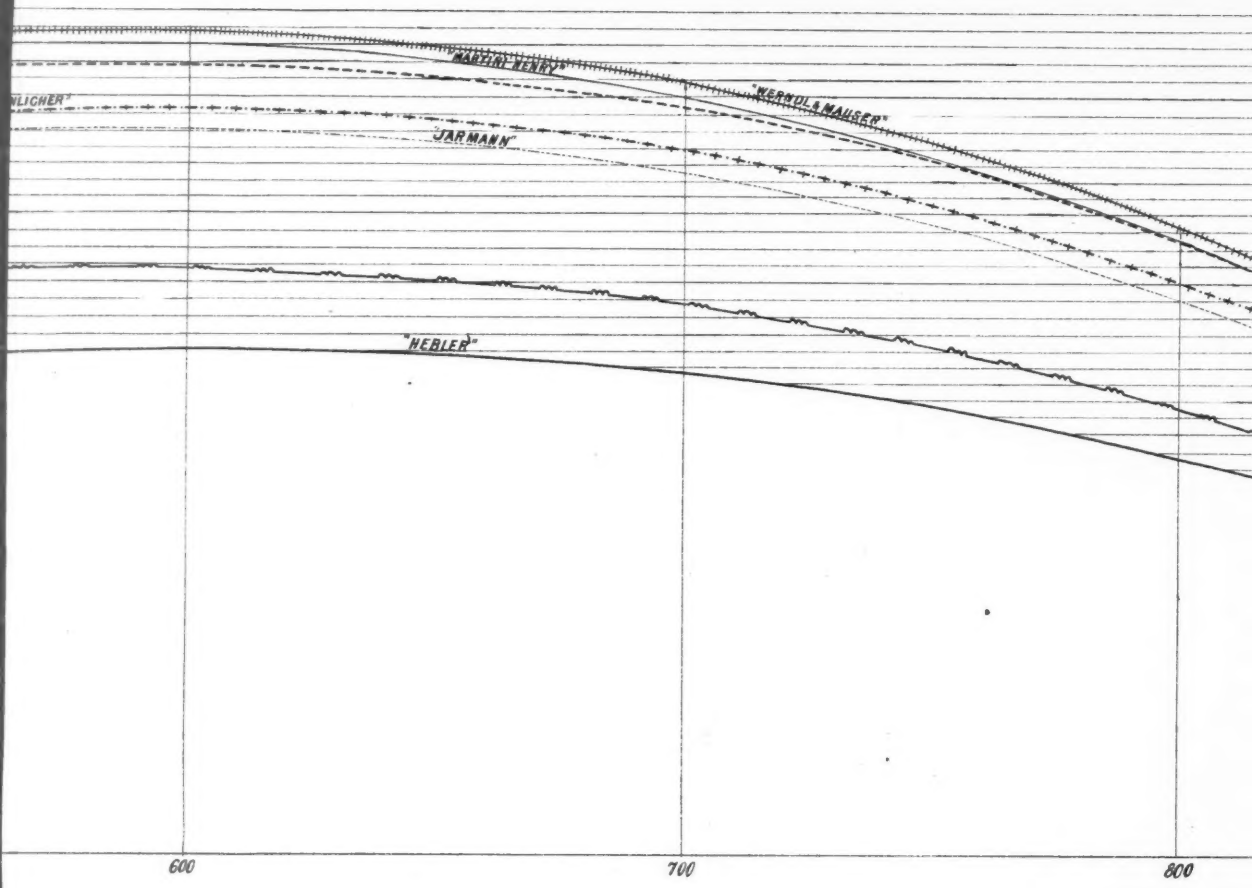


"HEBLER" RIFLE.

AT 600 AND 700 RANGE.

SCALE { HEIGHT, 15 FEET / RANGE, 900 FEET } = 1 INCH.



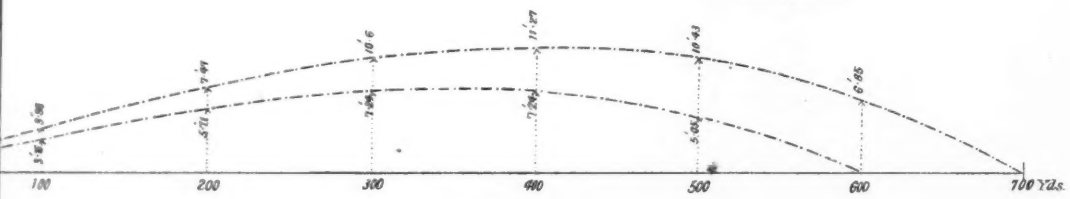


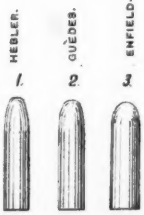
BULLETS

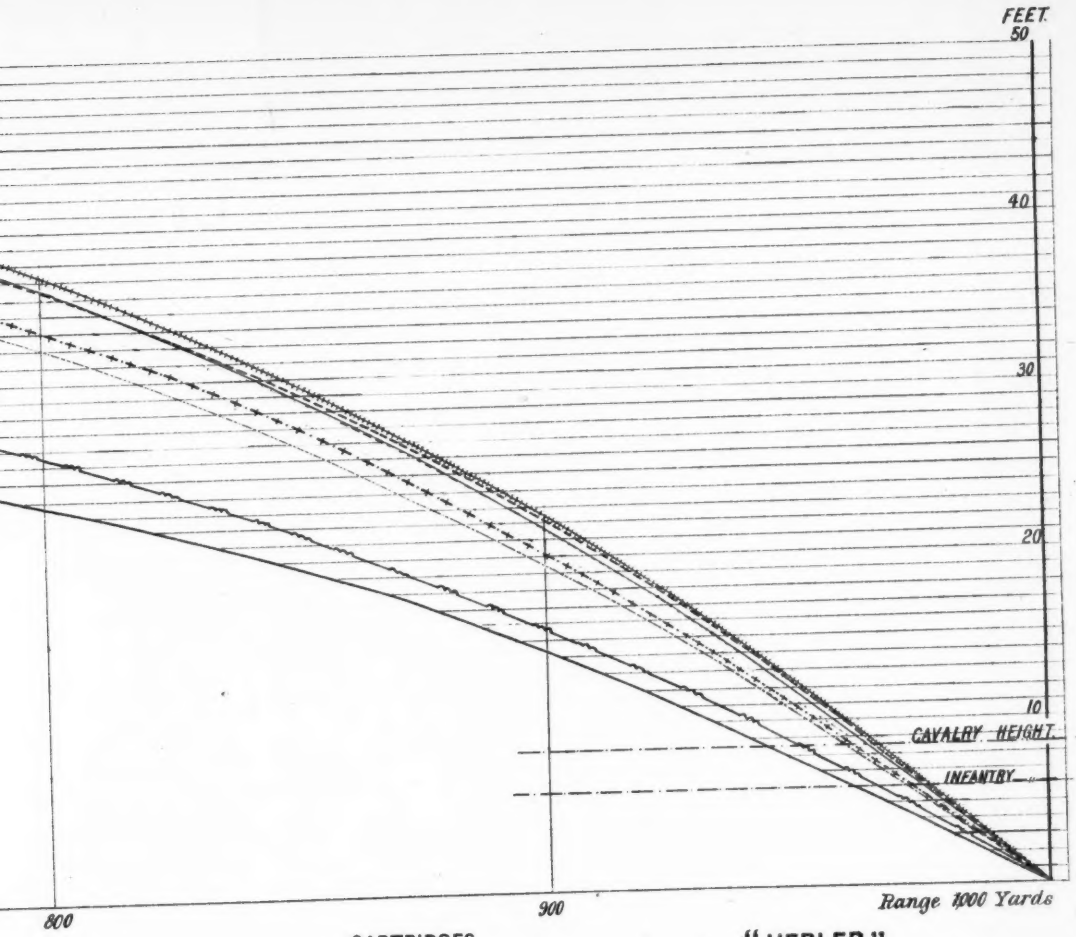
"HEBLER" RIFLE.

DRIES AT 600 AND 700 RANGE.

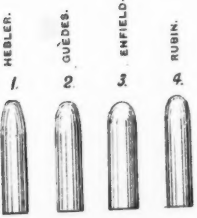
SCALE { HEIGHT, 15 FEET } = 1 INCH.
{ RANGE, 300 FEET }



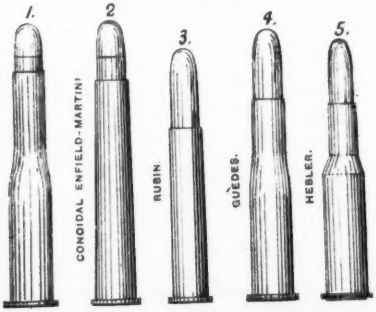




BULLETS.

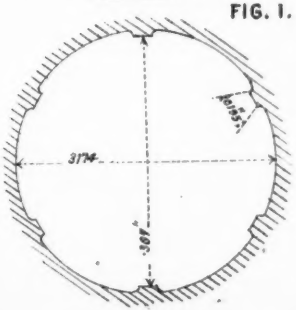


CARTRIDGES.



"HEBLER"

FIG. 1.



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OCCASIONAL PAPER.

This portion of the Number is reserved for Articles, either Original or Compiled, on Professional Subjects connected with Foreign Naval and Military matters; also for Notices of Professional Books, either Foreign or English.

It is requested that communications or books for review may be addressed to Colonel Lonsdale Hale, at the Royal United Service Institution, Whitehall Yard, London, S.W.

A SKETCH OF WAR AS IT WILL BE.

It would be difficult to find a subject of deeper interest to the readers of this Journal than that which has been chosen for this article. At the present season, when each succeeding day brings with it a fresh crop of war rumours from all parts of Europe; when all the great military Powers, which have for many years vied with one another in perfecting the organization, equipment, and training of their Armies, seem to be putting the finishing touch to their preparations; when many think that the outbreak of another great European conflict is imminent, and but few believe in the possibility of its being postponed for any length of time: at such a season as this, it is but natural that we should take a mental survey of the situation, and endeavour to form an opinion as to the probable chances of the coming struggle. We know not yet how the different nations will be arrayed, but we cannot fail to observe that, during the last few years of peace, progress in military efficiency having been universal throughout the European continent, the same general system of organization being, moreover, now common to all, and the disposable forces of each nation not being widely different in point of numbers, it is very difficult to assign to any one Power the superiority over any probable opponent. Nor is this the object of the present article, which only pretends to present to the reader a slight picture of the manner in which war will be waged between civilized nations the next time it occurs. In order to do this I have translated some portions of Parts IV and VII of Baron v. d. Goltz's great work "*Das Volk in Waffen*" (the Nation in Arms), which enable us to realize to ourselves the enormous proportions of modern warfare, and the great difficulties caused thereby to those in command, whilst suggesting to us means for overcoming those difficulties. Unless we, too, become a *nation in arms*, which will, I hope, never be necessary, it is highly improbable that any British Commander will ever be called upon to conduct war on the huge scale represented by Colonel v. d. Goltz; but it is all the same desirable that the British military student should form his idea of war from a life-size representation rather than from those in miniature, to which he is accustomed, and in which alone he is likely to be engaged, therefore I hope that the following pages will be useful. (L. G.)

THE MARCH AND THE BATTLE.

General Considerations.

The events which occurred during the campaigns of 1866, 1870, and 1871 still continue to be our best guide in judging questions which relate to the movement of troops and to actual fighting, for the Russo-Turkish War of 1877–78 took place under unusual conditions, the nature of the theatre of war, the absence of good communications between it and the main base, together with the want of adequate preparation on both sides, having produced both in the Balkans and in Armenia a state of things which reminds us of a much more primitive stage of warfare. When we read of the long-continued occupation of strong positions, combined with attempts upon the enemy's line of communication, we may almost fancy ourselves returned to the period of the Thirty Years' War, but recognizing, as we do, at the first glance that the frequent interruption to active operations, the disconnection in the strategical movements, was the result of peculiar circumstances, we are inclined to picture to ourselves the campaign of the future as one of continuous dashing enterprise, a series of pitched battles following one upon another in rapid succession, a sudden and vigorous lunge pushed home to the very heart of the enemy's country, winding up quickly with an advantageous treaty extorted from the vanquished foe.

Such was the case in 1866 and in 1870; such, we hope, may be the case in future. Bearing this in view, the principles which must always govern those who direct warlike operations, if they wish to bring any future war to an end, impress themselves upon our minds. Still it does not follow that every fresh campaign should assume the same outward complexion. Notwithstanding the judgment displayed by the Prussian leaders, it is possible that the war of 1866 would have taken another turn, had not the ability of the commander been seconded by the superior efficiency of the soldier, as well as by the superiority of his firearms. Again, during the first part of the war of 1870–71, we had a great superiority in numbers, whilst during its latter part we profited much by the low standard of efficiency on the side of the enemy. Enterprises, like the attack upon the lines of Amanvillers on August 18th, 1870, would hardly have been carried out with such success unless 200,000 Germans had been opposed to 130,000 Frenchmen. Again, the defence of the long position extending for 4 German miles (18 English miles) in rear of the Lisaine and Allaine, and taken up by General v. Werder to cover the siege of Belfort, could not have been ventured upon with 40,000 men against a force of triple strength, had that force consisted of good troops, and it only became possible because the Germans had to deal with an improvised army. But now that France, Austria, Italy, Russia, have followed eagerly in the wake of Germany, which led the way in the matter of military training, the actual efficiency of the different armies will become more and more alike, and they will in the end attain about the same standard, though this may yet be the work of some little time. Before 1866 it was difficult to form a just estimate of the Prussian Army, and of its peculiar strength, for that army had become what it was by means of work, unostentatious indeed, and unobserved by the outsider, but carried on vigorously in barrack square, on drill-ground, and on field of manœuvre. Two serious wars have now convinced the world of the value of that army, making it, at the same time, acquainted with the hitherto unappreciated

advantages of our military system. We shall not again be able to take the foreigner by surprise, but shall find him prepared for the peculiarities in our mode of making war. It is, however, remarkable that the French should appear, though imitating a good many German arrangements, to have no idea of carrying on a future war as we carried on the last, but still to adhere to their own system in this respect. Under certain circumstances, the boldest and most vigorous attack may be paralyzed by the stubbornness of the defence, and by abundance of resources on the side of the defender. Our late adversaries found their hopes on the maintenance of an obstinate defensive prepared beforehand, with a great expenditure of art, and with organization suited to the object in view. We quote the following passage from a French book which appeared some years ago, and which treats of the warfare of the future. "The French are not as yet powerful enough to conquer the Germans in their own land, but we shall defeat them with ease on our own territory." We have already alluded to the new fortifications in France. During the last ten years its eastern frontier has been provided with a cuirass of forts and fortresses, the existence of a few gaps in which can hardly be explained, except by attributing to the designer certain distinct military objects. The problem of closing all avenues of approach from the north and north-west has been nearly solved. When we consider the expenditure thus incurred, and the drain upon the defender's resources by providing garrisons for those works, we deprecate any imitation of this innovation in our own country. Other nations, however, richer than we are, and to which defensive action is more natural, may well adopt similar measures for their protection. Ancient history furnishes us with a parallel case in the frontier-lines of the Romans, the value of which endured for centuries.

Such conditions naturally repeat themselves under conditions substantially the same. When, however, you create a complete system of fortifications for a country, you import into the question an important fact, viz., the curtailment of mobility which makes itself more readily felt than the mere fact of your bringing the engineer into the foreground. We know how much is required to enable an army to exist, and to provide it with all that is needful, including ammunition. The necessity of having the free use of a number of roads and railways is felt, not so much for the sake of moving the troops themselves, as of bringing up provisions and stores. A Franco-German war at the present moment would, therefore, begin with a number of battles for the possession of fortified positions. Should the girdle of forts on the frontier be broken through, the invader would find behind them a chain of fortified camps, which would again interfere with his freedom of movement, and give fresh support to the defence. He would, moreover, be tied to his line of communication, passing through the breach by which he penetrated, a fact which becomes of all the greater importance because the slow progress of the invading armies would render it difficult for them to live upon the country. The French General de Rivière stated in the report which he presented to the Chambers upon the new system of frontier defence, that it was calculated to force the Germans in any future war to confine themselves to a particular line of advance. The French confess thereby not only that the principal superiority of the Germans lay in active field operations, but also that it is difficult for them to attain quickly enough to our standard in this respect, as in order to do so systematic training and instruction of all leaders would be requisite. The spirit of initiative and self-reliance contributes most to this end, qualities which cannot at once be imparted by inoculation, but require the labour of years to engender. It was, therefore, determined to give up the idea of competing with the Germans in the field, and to deprive us of our natural element, the power of free offensive movement, by erecting impreg-

nable forts to bar roads and bridges, thus forcing us to fight in a confined space. Until we can try the question by practical demonstration, there will be a great difference of opinion as to the best way of overcoming the newly created obstruction. Some are in favour of maintaining the defensive on the banks of the Rhine, and of keeping our distance from the thorny necklace of mountain forts. Others are all for storming them. Others, again, would pass between them, and leave them behind to be captured by the reserve troops which are following, thus shelving the whole question. A fourth party holds that an attack by "*vive force*" would succeed, whilst a fifth party considers a formal siege absolutely necessary. In truth, the mode and means of attack will vary each time, according to the circumstances of the invading army and to the disposition of the commander. In any case the advance will be delayed, and operations will be interrupted. This will not only cause a direct loss of time, but will also give the defender the opportunity of bringing up reinforcements, and of prolonging his resistance. Hereby a second cause of delay is introduced. It cannot be doubted that where a General has to deal with fortified positions of such a nature, his mode of action will at times become dilatory. In the east of Europe, although there also great works of fortification are under consideration, the preliminary conditions are somewhat different. Widely extended plains offer facilities for the continuous prosecution of operations, but at the same time the great extent of territory and the imperfection of the communications would produce similar results to those indicated in the west, namely, periodical interruptions in the course of operations, either till communication with the base is restored, or until the arrival of a season more fitted for the resumption of hostilities. Germany is really the only country which still furnishes a theatre of war suited to the energetic prosecution of a campaign, so as to bring it to a speedy conclusion, and we must on this account exert ourselves all the more to prevent our native land from ever again becoming the scene of strife, and endeavour to fight our battles outside our own borders. Although our commanders may perhaps in a future war show as much judgment, and our soldiers as much courage, as before, we must still make it clear to ourselves that we have no reason to expect a repetition of such fortunate and rapid progress as in 1866 and 1870–71. Just as King Frederick wrote to old Field-Marshal Schwerin after the battle of Lowositz: "These men are no longer the Austrians of old!" so at the commencement of the next conflict we shall have reason to acknowledge "these are not our enemies of former days!" It is certainly desirable that we should be clear upon this point, so that we may not commence a future war with false expectations, the inevitable result of which would be disappointment, shaking confidence in our leaders, although the slow progress of events might still be quite in accordance with the conditions of the case. The work will be altogether more difficult, whilst the results at first obtained will be much less important. The enormous growth of armies will moreover interfere with ease of movement. Millions of men are not to be pitched about here and there with the same ease as mere thousands.

Above all, the larger numbers cannot be subsisted everywhere like the smaller numbers, so that in handling the former more consideration is required. We know that during the campaign of 1866 a single column of the force which Marshal Benedek led from Moravia to Bohemia was no less than 15 German miles (67½ English miles) in length, that is to say, measuring from point to point it would have reached from Berlin to Magdeburg; from Stuttgart to Ansbach or Wurzburg; from Munich to Ratisbon.

[In order to bring this home to the mind of the British reader, we may say, about as far as from London to Portsmouth, Ipswich, or Ely; from Edinburgh to Renfrew, or from Dublin to Kilkenny.—Tr.]

Yet this column in comparison with modern hosts was not so very large, consisting as it did of three Army Corps and one cavalry Division, that is to say of about 90,000 combatants, which number would make no very great show in the field states of the armies of the present day. At the same time, this great extension of the column was not attributable to want of discipline in the troops, for as we have already remarked in treating of the strength and composition of Army Corps, a force such as described would require exactly the amount of room stated in order to get under way. This example gives one a good idea of the scale upon which future wars will be waged, and we may easily expand it a little more. By way of experiment, suppose the whole of the existing German Army to be marching upon one road. Each cavalry Division, which we will here again place at the head, will occupy two-thirds of a German mile (3 English miles). Then follow the Army Corps. Even if the marching columns are closed up, so as to exclude all gaps, rank following close upon rank, carriage upon carriage, we cannot allow less than 100 German miles (450 English miles) for the whole eighteen. Besides which, we must reckon the army headquarters, staffs with their departments and wagon-trains, the army service columns, or such part of them as are not attached to Army Corps, and a good deal besides; not to mention the reserve troops which take the field in great numbers. We find to our astonishment that when the head of the column reaches the Frankfort road at Mainz, the rear will just be able to get under way at Eydtkuhnen on the Russian frontier. Thus the whole high road from the Rhine to the Russian frontier will be densely packed with men, guns, and wagons. If they were to march uninterruptedly through a gate, it would take them a whole fortnight to pass. Masses such as these naturally fill up whole provinces. The Austrian Army in 1866 nearly required the whole margravate of Moravia, in order to get under cover, and the troops quartered in the southernmost parts of the province had nine marches to make before reaching those furthest to the front. Again, in 1870, the sixteen German Army Corps assembled on the Rhine occupied 120 German square miles (2,430 English square miles) of a very fruitful country. Over 200 German square miles would be required to shelter the German Army of the present day even if every place were crowded with troops (4,050 English square miles). Enormous, also, would be the extent of front if we were to draw up a gigantic host of the present day in one line. The French Army would reach from Epinal to Verdun, and the different Army Corps would be at by no means wide intervals, but on the contrary rather close together, when you take into consideration the fact that considerable tracts of country are covered by fortified lines. The assailant would, therefore, hardly have any opportunity for rapid and unexpected operations, for turning movements, or for attacks by surprise. It is only after the first actions of the campaign, which may deceive the enemy, and lead him to mass his troops on some one point, leaving other parts of his line weakly occupied, that the invader will have the necessary freedom of movement. We need only realize the almost incredible dimensions of the array to understand that the element of mobility must be small indeed during the first phases of the conflict. The division of the host into armies, reserves, and separate bodies detached for the performance of some secondary tasks to a certain extent lightens the difficulty, although each separate fraction of the force continues to be huge and unwieldy enough. Let us assume our armies constituted in the manner which we consider the most practical. The strongest one would then consist of six Army Corps and three cavalry Divisions. Let us suppose when the army is assembled on the scene of operations, a part of it, namely, two Corps to be separated from the rest and held back in reserve, another portion, say one cavalry Division, to be detached, four Army Corps will still remain available

for the front line. Now an Army Corps requires a front of full half a German mile (2¼ English miles) when properly drawn up for battle. Blume, in his "Strategy" (pages 161—162), puts the normal fighting front of a battalion of infantry at 200 metres, of a cavalry regiment in line at 300, of a battery at 90, of the artillery of an infantry Division at 400, of the corps artillery at full 700, of the whole artillery of an Army Corps at more than 1,500. From this calculation we may deduce that an infantry Division requires a front of 1,500, and an Army Corps one of 4,000 metres. This estimate is confirmed by the experience gained in the Franco-German War, according to which an entire army of the greatest supposed strength would require a front of 2 German miles (9 English miles). But the line of battle is apt to be somewhat loose towards the wings. Commanding points beyond the flanks are occupied. The cavalry Divisions extend to right and left of the line in more open formation. If we take this fact into consideration our front will be considerably increased. Most of the artillery, too, of the corps held in reserve will be brought up into the fighting line, which will thus be further extended. It is true that the numbers will be much reduced in the course of the campaign by losses on the march and in action, but this only applies to infantry, the length of the artillery not being much reduced by casualties. (There may, indeed, be some loss of guns which cannot be immediately replaced, but such losses count for little amidst the great mass of artillery which is brought to the front.)

The right estimate for the front of one of our largest armies seems to be under ordinary circumstances 2½ German miles (11¼ English miles), and that for one of the smaller armies consisting of three Army Corps, and one or two cavalry Divisions, 1¼ German miles (5⅝ English miles). On the 18th August, 1870, the 7th, 8th, 9th, Guard and Saxon Army Corps fought side by side on a front of 2 miles (9 English miles). The 2nd Army Corps and parts of the 3rd and 10th, indeed, shoved themselves into the line towards evening, but the ranks had already been much thinned by losses and casualties of all kinds, so that room had been made for the reinforcements. But battle days on which troops are packed unusually tight are exceptional, and on no other occasions, even when concentrated as much as possible for reasons of subsistence, will the army be placed so close together. Patches of wood, water-meadows, marsh, pieces of water, as well as ground swept by the enemy's guns, must be left out of the calculation, besides which your formations may sometimes be greatly restricted by the nature of the theatre of war. The Franco-German frontier, for instance, gives only just room enough for the two opposing armies to be properly drawn up. Although, therefore, according to the principles of warfare in the present day, we may aim at bringing matters as soon as possible to a crisis, although these principles may lead at the very commencement of the campaign to bloody battles, it seems probable that the general effect produced will be a severe struggle during which the contending hosts will be found, should you trace their movements on the map, to change their positions but little, or, at least, to make no great progress in proportion to the space which they occupy. It is only when after the utmost expenditure of force on each side some decisive result has been obtained, entailing upon one of the two parties the inevitable consequence of exhaustion, that more rapid progress becomes possible. It is certain that much of the mobility which has been so remarkable a feature of our later campaigns will be wanting in the wars of the immediate future. The picture which we have given of the gigantic masses of fighting men will make our reason clear for supposing that the conduct of operations of war has become more difficult than it was before. With such a depth of columns on the march, such an extension of the field of operations, such width of front when formed for battle, many things must remain concealed from the view of the Generalissimo. So it must be, and the commander must

accept the inevitable. The critic who with a cheaply earned reputation for wisdom so glibly pronounces what has happened to be unintelligible, would be more reserved in his expressions if he would examine for once closely, and reflect upon the sketch which we have given of the great difficulties which must result from the conditions which govern military actions in the present day. The telegraph, which generally connects the Commander-in-Chief with the troops under his command, is certainly able to overcome time and space, but not to reconcile the diversities which exist in the appreciation of circumstances by different men. In consequence of the fact that the masses of troops when on the march must be spread out on a very broad front, the chance of accidental collision of the separate corps with the foe is increased. When such collision produces a fight, the neighbouring corps on both sides hurry up in aid. A decisive action thus takes place where it was not desired, and when it was not expected. Thus with reference to the most important part of warfare, namely, the actual fighting, the Officer in supreme command has the least freedom of action, being with regard to this the most dependent upon the will of others and upon accident, for when he receives the first intelligence of a conflict, the action is almost always so far advanced that he must accept it as an accomplished fact, and just make the best of it. The little influence thus possessed by the Commander-in-Chief in choosing the occasion for decisive action is really an element of great difficulty in the warfare of the present day. The best plans of the General are often defeated, and his most accurate calculations become of no effect. To this the reply will be that the General must make his will known to all his subordinates, whose obedience should prevent such mishaps. But as it is impossible to give orders for and against everything beforehand in the field, each individual must act whenever a ray momentarily pierces through the darkness. The worst thing that could possibly happen would be for Generals and other Officers always to wait for orders from above for fear of making a wrong move, as such a course would lead to the loss of all opportunities, and they would be playing into the enemy's hands from the very first. Even on the few occasions when the possibility of decisive strokes can be foreseen, and preparations for them be made consequently in advance, as in the days of St. Privat and of Sedan, all that the General can do is to bring his masses up to the enemy in the right direction for the proposed operations. After this he can do little more than say with Mark Antony—

> "Now let it work! Mischief, thou art afoot;
> Take thou what course thou wilt."—*Julius Cæsar*, iii, 2.

Where six, eight, or ten Army Corps, with as many hundred guns, are in action amongst woods, rocks, mountains, valleys, and villages, with the smoke-clouds hanging densely over the combatants, the range of vision is much too limited for one pair of eyes to follow closely the march of events, and for the will of one man to reign supreme. The course of a great battle, to direct which is the most difficult problem that the human intellect can be called upon to solve, shows itself clearly as the result of operations which are the product of many wills and intellects, to whose efforts the supreme authority can only assign a direction converging towards the desired goal.

Importance of Discipline on the March and in Action.

When we realize the size of armies, we may well ask ourselves how it is at all possible to direct such large bodies of men. The answer to this question is that discipline alone makes it possible to move and guide them. There is no better solution of the problem. But the word "discipline" means so many things, that what it comprises does not seem sufficiently well-defined,

and the subject requires further explanation. Discipline is generally understood to mean good order and good conduct, upheld by steady maintenance of strict regulations. But with reference to this, we must observe that a severe code of military law is by no means necessarily accompanied by regularity and good conduct. There never was an army better disciplined than that of Germany during the last war, yet there never was a large army which took the field under such a mild code, which was moreover administered in the most humane manner. On the other hand, the history of former as well as of more recent times furnishes many examples of the co-existence of Draconic severity and of misconduct, without any diminution of either.

The French Republic of September 4th, 1870, kept a bullet in store for every disobedient soldier, and instances of military executions were by no means uncommon in its armies. Yet discipline was and continued to be loose. The actual fundamental relations between the two things was natural enough. All laws spring first of all from the surrounding circumstances, and only react upon them later on. We must not, however, imagine that discipline comes naturally in a well-regulated society, and that it is only the consequence of social morality. Not so; the trials to which the soldier is exposed are too severe for this to be the case. It follows as a matter of course that crime is less frequent in the army of a cultivated nation than in those of coarser races, but discipline requires more than merely negative services. It demands of the soldier that he should make nothing of venturing his life in order to overcome the enemy. It demands of him extraordinary efforts, and leads him to look on the extraordinary as something quite commonplace and habitual. The best explanation of discipline is found in a saying of Darwin's, to be found in his "Descent of Man": "The superiority which disciplined soldiers have over undisciplined hordes is principally a consequence of the confidence which each man places in his comrade." This unqualified confidence is doubtless the best agent by which discipline works, and it enables us to form a just appreciation of the peculiarity of what we understand by this much-used expression. There is, however, doubtless an absolute necessity for a code of law sufficiently strict to cause obedience to a superior to seem imperative. "The force of the passions cannot be restrained without the help of law" is a saying of Scharnhorst. Insubordination must, whenever it shows itself, be at once checked promptly and with sufficient vigour.

It would be a fatal error to imagine that a strict administration of the law can be dispensed with, as this constitutes the framework upon which discipline is constructed. The impression thereof is all the deeper in that the necessity for obedience extends alike to high and low throughout the army. Example has a far greater effect than precept, whether given in writing or by word of mouth. When the soldier sees those above him obey, he takes the lesson to heart. It is not, however, enough to obey the superior who is at the moment giving orders; it is to duty above all that obedience must be paid. Nothing should appear to the soldier more holy than the requirements of his calling. The common, every-day duties are more intelligible than the higher duties to the private soldier. Hence comes the value of the regulation in our army that the Officer should begin by performing all the duties of the private. He must first learn to obey, so that he may be able to command; that is to say, in the right manner and in a way intelligible to the plain sense of the common soldier. Further, this is his only chance of becoming thoroughly acquainted with the performance of the lowest class of duties according to his knowledge of which the men will after all really judge him. The zeal with which the, so-called, *minor* duties have been for so long a time carried out in the German Army is by no means merely the result of routine or of unproductive pedantry, but is rather due to the moral aim of creating

in the soldier's imagination a representation of duty in a manner adapted to his intellectual powers. The conscientiousness in small things should certainly not be confined to the mere technical details of military life; on the contrary, the many things which do not appear on the surface and which are required to make a man of the soldier deserve special consideration. A disposition to cleanliness, love of order, punctuality, carefulness, faithfulness. and decision, will best contribute to the establishment of good discipline, The custom has hitherto prevailed of leaving certain minor details of administration, such, for instance, as concern the clothing and subsistence of the men, in the hands of company Officers. This is not done with a view to economy, but in order to strengthen the influence of the Officer over those under him by means of the intimate intercourse thus produced. An Officer's work in the stores and in the barrack-room, in visiting cook-houses and other offices, makes of the company commander the guardian and main prop of discipline, the father of his men, and the expression of the soldier's artless feeling is full of significance when he jokingly calls his Captain, as he is wont to do, the "old un," although he sees older Officers giving the law to him.

This peculiarity in German army life, in combination with the belief in the necessity of a strict performance of duty, has created a feeling of most complete unity in the ranks. Therein consists our strength. The most complete interdependence between Officers and men has arisen from the zealous performance of duties common to both. Every man in the ranks knows by experience that his Officer will in no case desert the unit to which he belongs, that the same unit is like a family, with the same interests in common, and that it will always hold together in need and peril. Hence springs that confidence of which Darwin speaks, and by which that great judge of human nature explains the superiority of a disciplined force. The soldier meets the enemy's bullets with composure, because he is convinced that his comrades have the same feeling, and because he cannot think of leaving them in the lurch. The moral force derived from the feeling of interdependence remains firm when the excitement and confusion of battle render control impossible, and regularity, which is the offspring of law, has ceased to exist. The sentiments of duty and honour rouse at such moments in the heart of each soldier the firm resolve not to be behind his neighbour. During the last wars every single body of troops being thus inspired was ready to attack a superior force of the enemy whenever it appeared expedient to do so for the general good, or whenever a favourable opportunity presented itself.

Every General who ventured to take this serious responsibility did so in the assurance that every corps within reach would hurry to the scene of action as soon as it heard the thunder of the guns, and that the work so successfully commenced by himself would be completed by his comrades if his own strength proved insufficient for the purpose. Every leader was justified in thus thinking and in thus acting, down to the youngest subaltern at the head of a section of skirmishers. It is evident how great an augmentation of power thus accrued to the German Army, and we can also well imagine how the Commander-in-Chief, notwithstanding his limited influence over the course of combats and battles, could yet prosecute these decisive operations with full confidence, knowing as he did that though their procedure might vary, the different fractions of his army when put in motion would all aim at the same end, namely, to get at the enemy. No Officer in command who could possibly reach the scene of conflict would keep away from it. The "discipline" of the German Army was a sure guarantee of this.

Such is the way to render troops really mobile. The more numerous they are, the better must be the discipline, and we require it now more than ever, but it must be rightly understood if we wish its power to be displayed; it must be identified with the complete agreement of all members of our hosts

in the object of their desires, in the faithful performance of duty, and in devotion to the service of king and country. Although the principal source of discipline in an army is to be sought in moral influence, still in order to maintain it we must also look to purely material elements. We need hardly say that if troops are exposed in warfare to insupportable hardship, to fatigue surpassing what human strength can endure, to demoralizing influences in battle, to want and distress, the best discipline will in the long run suffer, and above all that unnecessary hardship and loss have a loosening effect. A great deal depends upon organization. It is of primary importance that the formations to which troops have been accustomed in peace should be preserved in war, for their disruption will always have a prejudicial effect on discipline, and the mischief thereby caused almost always outweighs the advantages which may be derived from breaking up tactical units so as to increase their number.[1]

It is well known, for instance, how much the discipline of the Danish Army was affected in 1864, in consequence of the order issued by the Minister of War that all battalions should be subdivided, so as to form a double number of war battalions. However, it is impossible to break up the family feeling in our army. It is a part of the inner constitution of our military system that every commanding Officer has more confidence in and exerts more influence over his own regiment, battalion, or company than he would in the case of a body of troops placed for the first time under his command at the outbreak of a war. Again, the soldier always obeys Officers known to him more readily than strangers. The maintenance of units as originally constituted is of such paramount importance that secondary considerations of convenience on the line of march and in battle must not be allowed to weigh against it.[1]

It may generally be accepted as a fact that a complete regiment of three battalions will be able to render much more service in war than three battalions taken from different regiments, and shuffled up together under one leader for the special occasion. Were we to mingle in an arbitrary manner together detachments from different Army Corps, the question of provincial peculiarities would then come to the fore. Some races in the German Empire require severe treatment, whilst others do better under a lenient rule; some should be humoured, others guided with a tight hand. A well-timed reproof will be most effective with the one, generous praise with the others. There is a considerable difference between the characteristics of a Brandenburger and of a Westphalian, between those of a Rhinelander and of an East Prussian. The Officers who lead the men in war should have been previously acquainted with them in peace-time. It is of great importance to discipline that men who have returned to civil life after doing their time with the colours should, if recalled to the ranks on mobilization, rejoin the same units in which they received their military education. They will thus be brought into association with old acquaintances, both as comrades and superiors, with whom they will easily get on good terms again; in fact they return to a position with which they are familiar, and in which they soon feel themselves quite at home. They have once more to have a share in the fortunes and in the reputation of the very corps to which they were before so

[1] These sound principles have, I think, never been completely recognized in the British Army, for the system of grouping together detachments for some special service has always been far too prevalent. Never, however, was this vicious system carried to such an extravagant pitch as in the last campaign on the Nile, and as fortunately no positive disaster resulted therefrom, we may, I fear, expect a repetition of the same error in our next war. If so, I hope that we shall only have savages to deal with.

proud to belong. The feeling of *esprit de corps* comes into play, a feeling which creates a noble emulation between bodies of men. The various considerations which must be duly attended to at the time of mobilization will, it is true, not always admit of a reserve man joining his own former corps, but this should be the rule whenever possible. The spirit of tradition and *esprit de corps* can only be well developed if Officers are retained in the same units with as little shifting about as possible. This particularly applies to the case of commanders of companies, squadrons, and batteries, in whose hands is the instruction of the men. Again, the peace strength of units should not be too much reduced, otherwise they can hardly hope to keep up their traditions, besides which a considerable numerical strength is required for certain branches of instruction. Companies and battalions with too low a peace establishment lose the power of acting as independent units, for they cannot represent properly at field exercise the action of companies and battalions on a war-footing, in consequence of which you are driven to the objectionable practice of mixing up several of these units and placing them under command of one of their Officers. This is what happens in France. If practised with us it would break through the fundamental principles of all our military education, of all order and discipline, which consists in the personal responsibility of every Officer for the efficiency of the body of men under his immediate command. His personal interest in the men, his personal influence upon them, would be diminished, and sooner or later discipline would suffer. We may mention another kind of discipline as necessary, and we may call it the intellectual as distinguished from moral discipline. If men's minds are not under control it becomes all the more difficult to manage them.

This is often experienced unpleasantly in an improvised army. When bodies of militia or of volunteers are assembled in an emergency there is, as a rule, no want of very capable and educated men amongst the Officers, as the pick of those who have not as yet adopted the career of arms must under such circumstances take the field. Many members of the highest aristocracy in France joined the armies of the Republic in 1870, occupying the lowest grades. There was thus plenty of intelligence in the ranks, but only of an undisciplined kind, with a great want of uniformity as to instruction, which led to a want of unity in action. We do not by this intend to imply that the leader should be bound to act according to a prescribed system. Not so ; for cut and dried forms do not suit war. Still, there should be a certain mutual agreement as to the mode of working out military problems, and this will be the case if you succeed by means of instruction and practice in implanting general principles in the minds of your Officers. Those principles should be inculcated by the instructor as leading guides to action, just as general directions (*directiven*) are issued by the General when providing for some particular operation.

The art of handling troops should be taught according to a regularly recognized system. Only thus can we arrive at obtaining any similarity of procedure on the part of Officers in the execution of any definite operation ; not that we expect or wish them to work exactly in the same manner, but only to be guided by the same principles. The solution of theoretical problems set as exercises to different Officers in peace-time presents plenty of variety, being intended to test the intelligence, and therefore leaving plenty of room for difference of opinion. In war everything is much more simple. When, for instance, the German armies were assembled on the Rhine in 1870, you could hardly have found a General amongst them who did not at once make up his mind to an advance into France, for we all felt anxious to take advantage of the superiority of our Army both in respect of numbers and of efficiency by at once assuming the offensive in a vigorous manner, for

we had all, as it were, inhaled this principle with the air of our military school. When this discipline of the intellect exists a Commander-in-Chief may with confidence allow much independence of action to his subordinates, as he may be certain that wherever he cannot intervene in person affairs will be carried on, if not exactly as he would have wished, at all events with the same practical result. Uniformity of intellectual culture is only possible when all Officers occupy the same social position, and it must necessarily be absent in armies whose corps of Officers is partly recruited from the ranks, partly from military schools and academies. For such armies complete unity of action can never be assured.

Concentration on the Frontier.

The opening of the campaign is preceded by the concentration of the armies on the threatened frontier. The more numerous the forces the greater the necessity for a well-considered concentration. To quote from the General-Staff History of the Franco-German War: "It is hardly possible during the whole course of a campaign to repair errors committed in the original concentration." At first sight the accuracy of this statement may appear questionable. One may be inclined to say that the issue will rather depend upon the result of the first combats and battles, which will in case of need afford a speedy opportunity of rectifying any error in the plan of concentration. There are plenty of examples in military history of campaigns commenced most unfavourably, but to which a single successful action gave a fortunate turn. We need only refer to Frederick the Great's adventures in his first campaign in April, 1741; the young king was completely surprised by Neipperg, whilst lingering in Upper Silesia.

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One can hardly imagine a more promising opening for Austria, or a more unfavourable one for Prussia, but the superior training of the Prussian Infantry told its tale at Mollwitz, and the most sudden change set in. This one blow made Frederick master of the situation. It appeared as though in this case strategical considerations were entirely without effect. The same impression is produced if we consider Czaslau, Hohenfriedberg, and Leuthen, in their connection with foregone events. But all these examples belong without exception to comparatively old days. The complete reaction upon one another of strategical operations and battles is one of the peculiarities of modern warfare. Though it may even now be within the bounds of possibility all at once by a single victory to give a happy turn to a campaign which has been badly commenced, it is still a very improbable event. In consequence of the subdivision of forces, of the great extent of front, of the independence of the separate commands, the preliminary movements will at once assuredly lead to complications. These operations can hardly have a successful issue unless combined with fortunate combats, just as the entry of the Germans into France was accompanied by the victories of Weissenburg, Wörth, and Spicheren. Nowadays tactical success at once gives the clearest evidence of any strategical advantage which may have been obtained. A badly planned concentration produces as its natural consequence the disadvantage that your army will not afterwards be in force where force is most required, so that it will be impossible to succeed in combats, where success is necessary to improve the general situation. Hence any mistake in the preliminary movements of concentration make themselves very widely felt, and will, as a rule, supposing equal adversaries, decide the retreat of one side and the advance of the other. The most striking example of this is afforded by the Austrian Campaign of 1805. Their strongest army, composed of the best regiments and under their most approved General (the Archduke

Charles), was despatched to Italy, where, as in 1796, 1797, 1799, and 1800, the most decisive operations were expected. Only 70,000 men under Archduke Ferdinand and Mack occupied the theatre of war in Germany, when Napoleon hurried thither by forced marches and with a very superior force from Boulogne. The result was the catastrophe of Ulm, which was not counterbalanced by the Austrian victory of Caldiero in Italy. Although the original mistake was now recognized, and the Archduke Charles was transferred to Germany, this measure could no longer affect the result of the war, for the battle of Austerlitz put an end to it before the Archduke was able to strike a blow for Austria. The first concentration of the French armies in 1870, in two separate bodies in front of Metz and in Alsace, was made with a view to a rapid offensive movement into Germany, for which, however, both the means and fixed resolve were wanting. In consequence of the wide separation of the two armies, a long retreat became necessary after the first defeats had made their junction impracticable. This produced MacMahon's retreat to Châlons, and Bazaine's early isolation at Metz. The march on Sedan and the catastrophe of September 1st ensued as the natural consequence thereof. There is thus no difficulty in connecting the heavy blows which fell upon the French during the whole first stage of this war with their original dispositions for concentration. The concentration of armies must needs take place as soon as the statesmen have determined to draw the sword. Hence political as well as military considerations must be taken into account, in addition to which attention must be paid to matters of supply and quarters, to geographical questions, lines of communication, and to the network of roads in the theatre of war. No State will like to give up a threatened province just at the commencement of a campaign even when to do so may appear advisable for military reasons. The teachers of the art of war have indeed maintained that such sacrifices must be submitted to cheerfully whenever demanded by higher interests, and as long as the conduct of a war was entirely in the hands of an absolute ruler this might be allowed to hold good, but nowadays the valour, strength, and confidence of the whole nation, as well as the national credit, play too large a part for such sacrifices to be endured. Let us only picture to ourselves the impression which would be made upon us if a war with France were to commence with the relinquishment of the left bank of the Rhine, or one against Russia with the evacuation of our territory up to the Vistula. The motives which would perhaps justify such measures in the eyes of a soldier would not be appreciated by the mass of the people, which would be seriously discontented if considerable tracts of country were thus abandoned without any apparent necessity, and given over to the enemy. Moreover, the evacuation of a province means giving up the advantage of its supplies and resources. If the enemy is able to occupy it, reconquest will be necessary before peace is concluded, however successful may be the result of the war. Learned critics have asserted that after the unfortunate campaign of 1806, the Prussian Army should at once have retired before Napoleon as far as the Oder in order to join the Russians. Even if Saxony had in consequence seceded and if many men had deserted during the long retreat, still the balance of strength would have been re-established in our favour on the Oder. That is quite true; but even if Napoleon's attack on the line of the Oder had failed the Emperor would still have remained meanwhile master of the richest Prussian provinces, and the Prussian Army would have had to reconquer its own country before it could occupy as forward a position as it held at the beginning of the war. The attempt to hold that position from the first does not therefore deserve blame; in war, as in other matters, the saying *beati possidentes* holds good. On similar grounds also Frederick the Great occupied East Prussia in 1757 as long as he could. During his various campaigns in Lusatia and Bohemia

he bore in mind the security of Upper Silesia. The same principle was acted upon in 1805 when the Prussian Army concentrated in Thuringia and Franconia, leaving a detached corps at Glatz and Neisse.

Again, in 1866, a Prussian army assembled in those regions, although an advance into Bohemia in the direction of Gitschin had been determined upon. The protection of provinces exposed to attack is one of the demands which must be provided for at the first concentration of an army. This does not, however, necessarily imply a direct occupation of the frontier. The end in view is very often attained by the vicinity of a large force which renders it so dangerous for an enemy to enter upon the unoccupied territory that he abstains from doing so. If we intend to take the offensive, our forward movement will soon have the effect of securing our own neighbouring districts, and the enemy will rarely be strong enough to send any considerable force into distant regions, so that their safety may be secured by reserve or garrison troops, even by local levies. Thus in 1795, when war with Russia seemed imminent, the Minister, v. Schrötter, intended to defend East Prussia with its lakes, hills, and woods by the Landsturm (general levy) of from 50,000 to 60,000 men resting upon a few strongholds. The portions of the field army whose first task is to defend the frontier during the concentration should, therefore, only be taken away from this work exceptionally for the purpose of taking part in great operations. If they, whilst executing their task, hold in check a hostile army, as Field-Marshal Lehwald held the Russians, or divert considerable portions of the enemy's forces from the decisive point, as did Masséna in Italy in 1805, they may well be left where they are, as they will be doing their fair share of the work. Otherwise such detached bodies should be so placed as to be easily recalled to take part in a decisive movement. That was the case with Schwerin's corps in 1757, when King Frederick burst into Bohemia, and we have another similar example in 1866, in the Crown Prince's army, when the Prussian attack commenced. It is therefore important that we should secure our own territory, whilst at the same time taking such measures as will ensure the concentration of our whole force on occasions of emergency. The transition from a state of peace to one of war will not always be as sudden as in 1870. The concentration always takes a good many days to make even with the greatest expedition, and the crowding together of great masses of men and horses always produces inconveniences of all kinds.

You have not only to consider the question of quarters, but even still more that of supply. Even if the troops bring some provisions with them from home they cannot entirely dispense with the resources of the region where they concentrate. It is at any rate a great advantage for them if they can be well subsisted for some time in their quarters. Measures will at once be taken to form magazines. Quantities of stores may doubtless be purchased on the spot or in the neighbourhood. The railways are chiefly used for the transport of troops. Water communications leading from important places to the point of concentration afford the greatest relief. It is evident that concentration is easier in a rich country well supplied with railroads, roads, and waterways, than in a poor and wild country where special measures must often be resorted to for subsistence. The natural features and the agricultural conditions of the field of concentration should therefore be carefully considered.

The events of the year 1877 teach us what influence politics have on the plan of concentration. Had Russia been able to count upon Austria as it could upon Roumania, it might have concentrated its Army of the South on the Danube instead of on the Pruth. No great anxiety was felt as to a possible offensive movement of the Turks across the former river for the purpose of disturbing the concentration. Neighbours whose intentions are

doubtful, trusty allies whose security is threatened, hesitating persons whom you wish to gain to your side by a speedy display of strength, neutral territories which from motives of prudence you wish to save from annoyance; all these elements have to be reckoned with at the moment of concentration. Above all, however, the situation of the main line of communication, particularly of the railways leading to the district chosen for the assembly of the army, is of primary importance. It is very evident that the belligerent who first completes his concentration gains a great advantage over the other side, for he can take the initiative, forcing his adversary from the first to follow his lead. He will also, supposing the forces on each side to be at all equal, have the advantage in the first engagements, thereby strengthening the *morale* of his troops, gaining confidence himself and arousing it in others. He will in short take the lead instead of following that of the enemy. He gains the preponderance at starting, and it will depend chiefly upon the manner in which he makes use of this advantage whether he is able to retain this superiority to the end. All this makes it clear to us why the huge armies of the present day strive so eagerly as to which shall be the first in readiness on the frontier. This race for place is not now a matter of days but of hours. It is therefore of much importance to use as many lines of railway as possible for our strategical concentration, indeed, if convenient, all lines which lead towards the theatre of war. In planning the concentration the Commander-in-Chief will make this point his first consideration, for naturally the question of how the troops are to be conveyed to the points where they are required is the first one to determine. Having recognized the enormous importance of accomplishing the concentration speedily, the connection of this operation with the mobilization of the army naturally follows. No party of troops is in a position to march at once from its quarters against the enemy. Reserve men must first be called out, a post being assigned to each. Hundreds of thousands, perhaps a million, are suddenly torn from their homes and put into rapid movement. All this must be prepared beforehand with the greatest accuracy, otherwise terrible confusion will arise. The most difficult part of the business is not the preparation of the line regiments for service. On the contrary, this is the easiest part of the matter, but numerous departments and special new formations have to be created; for instance, field reserve, garrison, and depôt troops, army headquarters, general government and government staff, etappe inspections, &c., most of which must be provided for specially from the different branches of the Service, and all of which are only created on the day of mobilization. Again, all supply columns and trains must be completed and horsed, the wagon parks organized afresh; departments of intendance, supply, field bakeries, post office, telegraph, finance, religion, sanitation, and military law have to be constituted. Committees of all kinds are assembled. The troops are clothed and armed, Officers, officials, and troopers are provided with horses, supply depôts are formed, provisions are bought and collected. Fortresses exposed to attack are put in a state of defence and completed with war garrisons, staffs, and every sort of requirement. Peace accounts must be closed, or the books handed over to provisional officials, archives and registers must be placed in security for the duration of the war. The clerical staff for the field army must be organized and supplied with all requisites. Then horses and material are transferred to their destination by rail in readiness for early despatch to the frontier. All this must be done in the course of a few days.

In 1870 the order for mobilization was given on the night of the 15th—16th July, and by the 4th August the frontier had been crossed, and the first victory gained. We must be still more expeditious in future. The task to be accomplished is one which not only requires long and careful preparation in time of peace, but which also when in course of execution strains to the

utmost the strength of all concerned, and demands their most active exertions. The whole nation is seized as with a fever, all private affairs being most seriously affected. The days of mobilization are a period of great excitement and effort for all. Colonel Blume justly remarks, "The mobilization of an army is under present conditions a severe test of the entire organization of the State and of the national spirit." A General's plans are mere castles in the air unless there is good previous arrangement for placing the Army on a war footing, the absence of which will not be counterbalanced by any amount of enthusiasm on the part of the nation at large. The example of France in 1870 is a warning to us. The superiority of Germany in point of numbers was well known in Paris, and the French wished to make up for the same by audacity and rapidity. The idea was good. The whole nation, animated by wild warlike fire, demanded a vigorous blow. But to deal this successfully, it was above all necessary to surpass the Germans in quickness of concentration, instead of which confusion and delay made themselves felt from the first. The boldest projects were of no avail, for the machine refused to act. Some of the telegraphical shrieks of distress which came pouring in on all the wires to the Minister of War from helpless subordinates have been preserved, for instance: "9,000 reserve men here. I don't know where to send them. In order to clear the place I'll send them all to Algiers in the transports which happen to be in the harbour." This from the General of the district at Marseilles. "How far are you advanced with your formations? Where are your Divisions? The Emperor orders you to hasten your organizations so as to join MacMahon as soon as possible." This from the Chief of the General Staff, who had long been Minister of War, to one of the Army Corps commanders. "Send me money so that I may feed my men. There is no cash in the public chest nor in that of the Army Corps." This from a General. "In Metz there is neither coffee, sugar, rice, brandy, nor salt, and but little bacon or biscuits. Send me at least a million rations to Thionville." This from the Commissary-General addressed to Paris. The Commissary of the 3rd Army Corps reports upon the troops then upon the point of marching off. "I have neither sick orderlies, ambulance wagons, army service men, field ovens, nor trains." And so on. Hurry, mistakes, want, disorder, prevailed on the side of the French, whilst the German mobilization was being accomplished in almost perfect tranquillity, so that as a natural consequence the Germans poured across the frontier into France before even the first step towards that offensive which was to repair all defects could be taken by the enemy. Thus the idea of crossing the Rhine, and of separating Northern from Southern Germany, became at once a thing of the past. Such will always be the fate of warlike projects if the preparations in peace are inadequate, if the power is not in keeping with the will. But neglect is not the only danger. There is another which may easily arise from the emulation between the different Great Powers in expediting the work of mobilization and concentration. Even men endowed with the greatest vigour will fail when impossible efforts are required of them, as the very feeling that they are exposed to such a strain will deprive them of clearness and composure. Great freshness of mind and body should be possessed by those who enter upon the work of mobilization, otherwise they will not prove equal to the task. Those who direct the operation must therefore avoid overwork quite as much as inactivity. Nothing is more damaging at decisive moments than nervous over-anxiety, of which feeling our simple forefathers knew nothing. It is a disease created by the excitement of modern life. However valuable may be every moment saved in mobilization, this gain should never be purchased at the cost of regularity.

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The concentration of the armies of two States of the first class presents

nowadays a picture of migration on the largest scale. On each side a million men and 300,000 horses are brought together as if the inhabitants of a small kingdom were put in movement, and they make their way to the frontier, where the whole mass is crowded into a small district. Were it not for the present means of communication, the transport and subsistence of such large bodies would be impossible, and the former can only become feasible where States have, like France and Germany, so much rolling stock that the whole mobile field army may be transported at once. It requires no special demonstration to prove how much labour and foresight are required to regulate this warlike migration of nations, this coming and going of countless railway trains. The preparatory arrangements for this operation give occupation to no small number of Officers, officials, and specialists in peace-time. Where so many weighty considerations come into play it is not easy to find the right solution for the problem. Yet the strategical concentration is the only operation of war which is completely in the hands of the Commander-in-Chief. The conditions, the considerations involved, are numerous and difficult, but they may be provided for beforehand, which cannot be said of the greater part of the incidents of warfare.

The General Staff on whom this work devolves is especially responsible for the success of this first act of the drama, in which uncertainty plays a smaller part than in all the other stages. It is only afterwards that fortune comes into play and exercises her sovereign power so as to rule the course of events, setting at naught the influence of even the most exalted human intellects. The task has been performed with success twice in modern warfare. The concentration of the Prussian Army in 1866 is one of the best examples of the kind. Judging after the event, it appears as if it could not have had a different result, but we have only to consider the situation at the opening of the campaign, and we cannot fail to perceive the extraordinary nature of the feat. Three groups of hostile States were opposed to Prussia, in the west, south-west, and south. In the midst of them, its own scattered territory, with frontiers which appear to be most unscientific; and with part of its forces detached to Schleswig. Austria had five weeks' start in the war preparations, when Prussia mobilized her Army between the 5th and 12th May. She was nevertheless ready with her forces concentrated on the Saxon and Silesian-Bohemian frontiers by the 5th June, thus getting in her turn fourteen days in advance of Austria. This was only accomplished by the bold determination of the Prussian strategist to turn the whole strength of the kingdom at once against its most powerful foe, further by making the most skilful use of the five lines of rail which led to the theatre of war, and lastly by forming three independent armies. This last measure was at the time much criticized, and yet it was of all the most fruitful of good, as it contributed more than anything else towards regaining the lost time, from the fact that a greater number of roads could be made available for the concentration than if the whole force had been assembled in one mass. Moreover, it enabled us to guard Silesia and the March of Brandenburg at the same time, to subsist our armies without difficulty, and to make immediate use for our advance of a great number of good roads. Still it must be confessed that a forward movement followed as an absolute necessity, for it would have been fatal to us to remain awaiting the enemy with armies thus extended over a front of 60 miles (270 English miles), from the Saale to Neisse, moreover separated from one another by the Elbe and by numerous tributaries of the Oder. A forward concentration in the enemy's country could alone remove the danger of the situation, and this measure had been contemplated from the very first. Venturesome as it might seem, it was in accordance with the dictates of prudence and foresight. The successful result was not due to chance, but to the fact that the general plan was suited to

the situation. A short-sighted critic expressed himself in the following manner concerning this concentration and the first operations: "Prussian generalship did not rise above mediocrity in its strategical combinations;" to which a well-known writer gave the following answer: "The difficulties inseparable from war seldom admit of our attaining ideal perfection, but even mediocrity, as the result has shown, may attain its object. The timely concentration of the German armies has never been claimed, at least by the Prussian General Staff, as a perfectly brilliant conception, or as a very scientific combination. It was simply a mode of escape, intelligently planned and vigorously carried out, from the original situation which was unfavourable but inevitable."[1] The points worthy of note in the German concentration in 1870 are, firstly, the well-calculated boldness with which it was carried out on the other side of the Rhine, notwithstanding the sudden outbreak of the French; and, secondly, the confidence shown in concentrating the whole force in the Palatinate, thereby relinquishing all direct defence of Southern Germany on the Upper Rhine. No measure could be more judicious, for the great German armies which appeared upon the Saar threatened Paris so directly that the enemy could no longer entertain the idea of any extensive enterprise. No fixed rules can be given for the concentration of an army any more than for other operations of war. As a general rule it is only the conditions upon which the original assembly of the troops depends which can be explained, and these conditions will vary in whole or in part with every fresh case. To form a right judgment concerning them in each particular instance requires a military eye, but good instruction is also of great value. If we study the theory of the great operations of war for no other reason but to be sure of our measures at the commencement of a campaign, this alone will amply repay us.

The Plan of Campaign.

"I never had a plan of operations" is a saying of Napoleon's. The belief in a plan of operations has nevertheless lasted down to our own times.

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The work of the General Staff on the war of 1870 contains the following passage:—"It is only the unprofessional observer who believes that he can trace in the events of a campaign the evidence of a plan which has been prepared beforehand in all its details and worked out to the very end. The Commander-in-Chief will doubtless always keep his principal objects in view in spite of any change of circumstances which may arise, but the measures by which he may hope to arrive at his end can never be settled upon with any certainty long beforehand." This is in accordance with Napoleon's saying; indeed we may assume that he meant substantially what we have just said. As far as it was possible to foresee with any clearness what were the first steps to take, he kept these firmly in view, and made every preparation for taking them. With all his boldness, he was a very careful General, and his depreciation of fixed plans was only intended to apply to those of the old school of military scientists, which with all their show of sagacity were nothing but useless pedantry. In proof of this we may cite the plan which Charles William Ferdinand of Brunswick proposed at the Council of Monarchs at Potsdam on November 3, 1805. Napoleon had captured Mack at Ulm, and was preparing to penetrate to the heart of defenceless Austria. But the Duke pointed out that the Emperor could never march past the Tyrol as long as the Austrians maintained themselves in that country, and that he would in consequence be easily brought to a standstill. Then the Prussians from the

[1] From No. 18 of the "Militair Wochenblatt," of 1867, attributed to Field-Marshal Moltke.

north and the Austrians from the south would fall upon his rear, while the Russians would throw themselves upon him as soon as he made haste to turn to the right about, which he could not fail to do. The Duke was thus prepared to cut him off from his communications with home at the Neckar, so that he must needs either save himself by a rapid flight across the Rhine or seek a refuge in Switzerland.

After these successful operations, the allies were to gather on the Rhine during the winter, holding it from Wesel to the Lake of Constance, so as to restrict Napoleon to the other bank. Still more, the Prussian Generalissimo also provided for an attack on the French Emperor by way of Holland and of Italy, and thus a gigantic net was to encircle the lion from the North Sea to the Mediterranean, and he was to be captured. But supposing he were to free himself by a successful battle, what then? The Duke got over the difficulty very easily. "Napoleon will lose the battle; he must lose it." Truly, if it be allowable to reason in this manner, a war plan may well be woven beforehand from beginning to end. But instead of the French retreating, they marched on Vienna; instead of being defeated, they conquered at Austerlitz; and the whole plan resolved itself into what it really was, a mere castle in the air. The ruling element in war, uncertainty, commences its reign with the beginning of the operations which succeed the concentration of the armies. Things always turn out in real warfare differently to what has been expected. Nothing more natural. The independent will of our adversary soon encounters our own. He who would calculate beforehand the course of events must draw his conclusions from one known and one unknown quantity. The result of such a calculation must needs be uncertain. A little certainty comes into the matter only after events have proved which of the belligerents is the stronger, for the one who gains the advantage knows that he can then carry out his designs in spite of the enemy's opposition. He therefore obtains a better foundation for his combinations than his adversary possesses.

Each of the contending parties will endeavour to gain the vantage ground, and so, to put it simply, each belligerent will try to gain a great decisive action. At any rate, whoever has a fixed determination, and is conscious of the greater self-confidence, will aim at battle. The enemy's main force is therefore the first objective upon which each army directs its movements. When this rule is departed from retribution seldom fails. The latest example of this is afforded by the summer campaign of 1877. The Russians, once across the Danube, reached the Balkan passes with great expedition, and pushed through this protecting barrier. It looked as if the road to Constantinople lay open before them, and as if the capital would be reached in a fortnight, whereas to get so far had been reckoned as the work of months. But there was yet a serious obstacle in the way. The Turkish armies north of the Balkans were still unbeaten, and the fate of the campaign depended upon the accomplishment of this task, which had been left unperformed, and not on the gain of certain mountain passes. Hardly had the troops of Osman given their first sign of life, appearing on the Lom and at Plevna on the flank of the Russian advance, than it became necessary to give up what had been gained, and to revert to what had been deferred, namely, the arbitrament of the battle-field. Until this could be obtained, everything came to a standstill. The conqueror in battle subjects indeed the will of the vanquished to his own, without, however, entirely depriving him of the free use of it. Decisive actions like that of Sedan, where whole armies disappear at one blow from the scene, are very exceptional. The will of the defeated General usually retains some power. That of MacMahon, spite of the defeat of Wörth and of the faulty composition of his corps, after being reinforced at Châlons, still sufficed to divert the principal German army from its march on Paris to

the northern frontier. It is therefore evident that victory in battle does not completely ensure the accomplishment of a General's designs. Even after victory in battle, further success depends upon the incidents of the moment, upon the complications which arise from the action on both sides. This leads to fresh combats, every one of which alters the situation as completely as a shake changes the chequered field in a kaleidoscope. The General is therefore daily, and often almost hourly, forced to accommodate his combinations to fresh conditions. The military historian seldom gives a complete picture of those transformations, for he generally picks out of the mass of facts those which continue to attract universal interest, omitting things which, though of momentary importance, have afterwards faded from view. After a war, one should not only give the history of what has been done, but of what has been intended; such a narrative would be full of instruction. The influences which affect the conduct of operations are much more confusing than one would imagine. Many a day to which the historian only devotes a few lines may have been most momentous. The General has to keep many things in view at the same time. He must assist a subordinate in one place, restrain one in another place, so that his efforts may be constantly directed on the goal glimmering in the far distance. A change of plan is being constantly required to suit each new situation, and it depends upon the amount of acuteness and steadfastness possessed by the General whether his guiding idea is carried through all these variations like the scarlet thread in a strand of rope. Whence is this guiding idea derived? From the general situation, military and political, by weighing which he may generally come to a decided determination as to what action will be necessary in order to deprive the enemy of any desire to continue the conflict. The weaker of the two belligerents will say to himself that by persevering in resistance to a certain point he will tire out his opponent or gain allies, whilst the stronger of the two will form an opinion as to how far he must proceed after annihilating the enemy's main army—whether he will have to occupy the capital, or the central provinces, or the whole country, so as to attain a satisfactory peace, which is the object aimed at in every war. According to the conclusions arrived at, the General will form in his mind a sketch of the course which he must strive to follow throughout the constantly varying incidents of the war. He may perhaps accept as a principle that resistance must be carried on in this or that place until reinforcements arrive, or until the army of an ally appears upon the scene, or he may, if conscious of strength, make up his mind that after defeating the enemy he may drive him into a district selected as unfavourable to the latter. But the best strategist cannot go beyond such very general views and designs as these. When he comes to details, he can only make sure of the very next moves in the game. No plan of operations can be carried with any certainty beyond the first collision with the enemy's main army. Unfortunately the General's plans seldom become thoroughly known to the world, being usually so mixed up with political considerations that it becomes inexpedient to make them public. The few exceptional cases have, therefore, the greater value, such as, for instance, the Memorandum of the Prussian General Staff, written in the winter of 1868–69, and published in the "General Staff History" (vol. i, p. 73), upon which document the plan which directed the first movements of the German corps in the great war was founded. We find in this paper, after some general reflections upon the situation of France and Germany, with a comparison of their warlike resources, the plan of concentration for the three German armies fixed almost as it was afterwards carried out in practice, all details upon which a General-in-Chief was required to decide being even given. Further on, the necessity is insisted upon of at once seeking out and attacking the French Army, which is assumed to be certainly close at hand.

The lines of advance for the armies during those memorable August days could therefore be easily chosen. Proceeding further, one only leading thought is indicated, that of forcing the enemy away northwards from his line of communication with Paris, of which design the only thing which could be said in anticipation was that it was the most desirable thing to accomplish. The idea thus indicated only in a general way was pretty sure of realization, but it could not be taken as a prophetical guide with regard to details of operations. In the advance of two of the German armies to the Moselle, south of Metz, in the movement of the third army on Châlons, in the march on Sedan, in all these operations we recognize the endeavour to drive the enemy into the smaller northern portions of France, thus at the same time cutting him off from the capital and from the resources of the south. But even the eye of the seer would not have detected beforehand Bazaine's intention to stand fast at Metz, and that MacMahon would thereupon undertake the fatal march which was intended for his rescue. Such momentous enterprises have their origin in the fluctuation of feelings generated in the mind of the chief at critical moments. An accident, a piece of news in itself of no moment, an inspiriting or a depressing word, may give a new turn to reflection and resolves. It is only a plan of campaign as wisely limited as that in the example before us which has any chance of accomplishment. The expression "scheme of operations" is therefore more appropriate than that of "plan of campaign."

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Services of Intelligence and Reconnaissance.

Information respecting the enemy is, as Clausewitz remarks, the foundation of all ideas and actions in war. It is therefore only fitting that we should devote a considerable portion of our space to this branch of the subject.

A General can hardly take a better guide in forming his own plans than the probable action of his adversary. At the same time he should not allow himself to be entirely dependent on this action. He must have but a faint heart if he only thinks of warding off attack. He that is endowed with the stronger will always endeavour to take the initiative and to give the law to his enemy at the very point where action will be most felt. But to have the power of doing this you must be able to see through your opponent's designs. Good intelligence gives a great advantage. Frederick the Great remarks in his "General Principles of War" (1753), "If one could always be acquainted beforehand with the enemy's designs one would always beat him even with an inferior force." Nowadays, we commence a war with a considerable knowledge of the enemy, because we have already carefully studied his military organization in peace-time, to do so being one of the special duties of the General Staff. A right appreciation of our adversary before the campaign commences is a necessary foundation for the whole work of the Intelligence Department. As before remarked, we shall not be in the dark as to the first concentration of the hostile forces. Indeed, when the first transport of troops commences the enemy's country will not be entirely closed to us, and communications from it may be received, but the case is very different when movements actually commence, the original picture being thereby soon veiled and transformed. From that time forth fresh light must be gathered daily.

Amongst the different means which contribute to this object those which armies possess in themselves are preferable to all others. The value of spies for the purpose is much over-estimated, their utility in warfare of the present day being much restricted. When the French remarked in 1870 that the Germans were evidently acting upon good information, a loud outcry was raised about the Prussian system of espionage which was everywhere trace-

able, according to popular belief. This outcry only served to show that "La Grande Nation" of those days had no very clear idea of the conditions of warfare. Cavalry is really the eye with which an army sees. Activity and energy on the part of this arm will be the surest factors in obtaining a clear conception of the measures and intentions of the enemy, whilst the rapidity with which it can move enables it to seize opportunities when they offer. Cavalry should discover to-day what the army may expect to encounter to-morrow or even later on. It should find out the enemy's marching columns, his camps, his outposts, and then keep them constantly in view. It should encircle the foe as with an elastic band, yielding to his pressure where it is strongly exercised, but closing upon and following him up when he retires. The intelligence which it communicates has the advantage of being that of the immediate moment, and it treats of what is at the time of importance. Moreover, the information thus obtained has this advantage over that which emanates from spies, that it proceeds from professional soldiers who are capable of forming an opinion as to its value. Much intelligence and knowledge of war on a large scale are required of those engaged in this service, and the cavalry Officer of the present day receives a training in accordance with these requirements. These remarks lead naturally to some general observations upon the service of reconnaissance. Military manuals expatiate a good deal upon the manner in which a few well-mounted Officers, each accompanied by a handful of daring troopers, penetrate the enemy's line of outposts, sweep round his flanks, and take their observations close in front or in rear of his headquarters. Such feats, whenever performed, are worthy of note, but their accomplishment is full of difficulty, for the adversary will use his cavalry in like fashion. They require extraordinary courage, circumspection, and withal, luck. We must, therefore, not count upon them too much, although very good cavalry will do its best to shine in this manner. In the campaign of 1870–71 many very valuable reconnaissances were made by individual cavalry Officers, but we must not forget that the enemy's horsemen did but little to interfere with their enterprises. In future it will not be so. It is important, too, to gain touch of the enemy at a considerable number of points. A single report will seldom be conclusive. To begin with, this is prevented by the vast dimensions now assumed by military operations, a circumstance always to be borne in mind. Reports, however, coming in from twenty or thirty different sources when put together make up the desired picture. To draw up a good report is as difficult as to prepare a good order. Clearness is the first requisite in both. It is impossible to lay down any fixed rule as to the matter and manner of a report. In great operations of war we have only, as a rule, to deal with reports from Officers, and, therefore, we have all the more reason to rely upon the judgment of the informant. There will only be occasional cases in which an observer will be required to make an immediate report of what he notices. When the enemy is remarked for the first time, when infantry and artillery are seen to be following his cavalry—the only arm hitherto visible, when positions believed to be held are discovered to be unoccupied, important passes to be open, river lines of consequence to be unguarded, when the enemy makes some remarkable alteration in the direction of his march, or when a distant cannonade shows that a collision has occurred, on such occasions as these intelligence is at once dispatched to the rear, so that the leaders of the advancing columns may have early information of what is going on. It is thus of just as much consequence for a General to know that the cavalry has nothing to report, and that it has not succeeded in discovering the enemy in a certain district, as to learn that he has shown himself elsewhere. The General feels all the more secure when the negative completes the positive. This is of itself enough to prove the importance of a constant succession of reports even when there is no remarkable news to com-

municate. Of course what is heard and what is gathered by hearsay will do much to complete the evidence of the eye. Much may be learnt by a careful examination of the inhabitants. Facility of communication has increased to an enormous extent the general interest in and curiosity as to what is going on in the world. Rumours about great movements of troops are always widely spread. It is often quite a riddle to make out how bad news containing an element of truth is disseminated during war in spite of the obstacles which then interfere with the ordinary channels of communication.

The inhabitants in the neighbourhood of Metz had already heard of MacMahon's march to the relief of Bazaine when the movement had only just been commenced, and before any of the more important combats which preceded the Battle of Sedan had taken place. In this respect, however, a great difference will be noticed between persons of different nationalities. It will be certainly much more difficult to extract anything out of a silent Englishman or Russian than out of a lively talkative Frenchman or Italian, but you may always find out something, and it is by no means necessary, in order to do so, that your patrols should come across an intentional traitor to his country, for every person under examination will be ready to say what to him seems unimportant, so as to put an end to the troublesome interview. Now, by splicing together a hundred unimportant items of intelligence, you arrive at something worth knowing. Besides, you are justified in concluding that in places where no intelligence is to be gained, there are really no warlike operations in progress, a conclusion not to be despised, for it increases considerably the feeling of security.

It is not a good thing to scent an enemy all round. You may rest assured that wherever he may be he will show himself clearly enough sooner or later. An Officer when sending in a report should abstain from putting reflections of his own in it. He should merely give a clear account of all that has come to his notice. It is the business of the higher authorities to form an appreciation of the degree of importance to be attached to each particular piece of intelligence, as they are in a position to understand the connection of each fragment with the general whole. An expression of opinion by an Officer in a report has often led to an enterprise which might seem useful from his point of view, but was really inconsistent with the general interests of the army. In 1806, when the Duke of Brunswick was proposing to make a carefully planned movement through the Thuringian Forest, he sent Captain Müffling over the mountain range to reconnoitre. This Officer found that the French were on the move towards Saxony, and that the country along the Franconian Saale was already abandoned by them. This seemed to him to have been done without "any sound reason," as Napoleon had thereby left his communications with the Rhine unguarded. Müffling tried to induce the Duke to make an attempt upon these communications, and gave him a picture of the fine *coup* which he thus had the power of making. He, of course, only thought of employing cavalry for the purpose, but the more cautious Duke, not wishing to let this tempting opportunity slip, yet at the same time not wishing to expose the detachment to risk, determined to send artillery and infantry as well as cavalry. In consequence of this, the Prussian Army, already very inferior in number to the enemy, was further reduced during the decisive double battle of October 14th by the despatch of 11,000 men on an entirely fruitless expedition against the French line of retreat. By volunteering an expression of opinion as a supplement to his report, Müffling contributed to the perpetration of what was one of the most serious errors committed by the German leaders during those momentous days.

It is evident that in drawing up a report a clear distinction should always

be made between what the sender has seen with his own eyes and what he has learnt from others. If the report is in writing, the great art will consist for the writer in his putting himself into the place of the recipient, so as to judge whether all he states will be intelligible to the latter. Cavalry may contribute much valuable information by means of the documents which it has the opportunity of capturing in the enemy's country. It is the first to visit places hitherto undisturbed. It will find letters remaining at the post office, telegrams at the telegraph office, newspapers in the houses of private individuals, at hotels, and restaurants. These are all useful sources of information. Cavalry soldiers must have inventive talent. Even things least apparent must not be allowed to escape notice, for they too may have their importance. It will not be difficult for an enterprising leader to give a healthy stimulus to this service, for all men have a certain degree of pride in making discoveries which only needs awakening. In order to see much, cavalry must be well extended. It will gain a great advantage by overlapping the enemy's flanks, and it will at the same time be all the better able to conceal the movements of the force to which it belongs. At the same time the extension must not be carried too far, for if the veil is too thin the enemy will break through it, to prevent which, bodies of horsemen in close order should follow in rear of the patrols. The enemy will think and act just in the same manner, the natural consequence being that the cavalry Divisions, which are pressing on in advance of the two contending armies, will soon come in contact. When the intervening space is sufficient, and when the nature of the ground does not prevent it, the operations of the main bodies will be preceded by a series of cavalry combats. No army can gain any important advantage by means of reconnaissance unless its cavalry succeeds in beating that of the enemy. It is only after this has been done that single Officers and small patrols can get at the enemy. In short, to be of use, your cavalry must be superior to that of your adversary, not, of course, merely in numbers, but also in efficiency, for the weaker cavalry will very soon be driven behind the columns of the army corps which are advancing, where it will be in the way rather than of any assistance, as when thus placed it can neither conceal the movements of its friends nor discover those of the enemy. This consideration should be taken into account when the oft-repeated question of the proper proportion of cavalry in an army arises.

Like so many other points which concern the military organization of modern civilized States, the strength of the mounted arm must depend upon the relative proportions of the Powers which may possibly be exposed to one another as enemies. There has been much talk of late of the widely-extended forays of large masses of cavalry on the flanks and in rear of the enemy's army, with objects beyond those of mere reconnaissance, aiming as they do at the destruction of railways, telegraphs, bridges, magazines, and depôts. In the American War of Secession there were a number of these so-called "raids," which made the reputation of such leaders as Stuart, Ashley, Morgan, &c. But before we attempt to transplant this system of warfare from America to our own theatres of war, we should well consider the very great difference in character, culture, and extent which exists between most of them, particularly those of Western Europe, and those of the New World. Then, again, we have to reckon with the different constitution of the military forces. When an improvised corps of horsemen, such as alluded to, was dispersed in one of these raids, or on being surrounded broke up of its own accord, the matter was of little consequence as long as the loss was balanced by successes previously obtained. A very different impression would be produced by the destruction of one of our cavalry regiments, a corps intimately connected by history and tradition with the

army of the nation, and, moreover, if demolished, not so easily replaced as a voluntary association of adventurous young farmers. The thorough organization of the armed force in our civilized countries is also unfavourable to raids, for even after the regular armies have taken the field, if there be some time for preparation, invasions of horsemen may be repelled by armed levies raised on the occasion. The French Franctireurs in the Western Departments opposed our cavalry whenever the latter were unsupported.

When enterprises of this nature are attempted in European warfare, small detachments boldly led will gain their object better by craft and rapidity than will larger portions by mere force. All that we have to imitate in the American cavalry leaders is their bold love of enterprise, for the mode of action practised by them will not answer on European soil. Most of our troopers now carry a good firearm, and they were not without this even in 1870, for they soon took to the Chassepôt when in need of it, but they have at the present time the further advantage of being properly trained to the use of firearms and to fighting on foot, thereby gaining an increase of independence, for they can now not only guard better against surprise than in former days, but can also check the enemy with greater ease, have more chance of deceiving him into the belief in the presence of infantry, and last, not least, are more fit for vigorous offensive action.

Although we must not expect too much from horsemen fighting on foot, bearing in mind that a magnificent squadron becomes when dismounted an indifferent body of infantry, and that the right place for a trooper is the saddle, yet we may rest assured that cavalry trained as it now is will be found more efficient than has hitherto been the case both in penetrating the enemy's designs and in concealing your own. This gain will, it must be hoped, at least make up for the increase in the difficulty of carrying on war, which has made itself felt within the last ten years. Frederick the Great's saying, "A good cavalry makes one master of the field," has lost its meaning in so far as the power of cavalry in actual battle has been reduced, but an efficient and numerous cavalry is still the best tool for enabling you to take the initiative in a campaign. As in certain games the player who has the first move possesses an advantage, so in war, the General whose cavalry establishes its superiority, and thus enables him to see his way before his adversary can do so, will be the first to form his plan of action and to commence operations. But cavalry must not only be efficient, it must also be properly made use of by the Commander-in-Chief. Many a fault imputed to the cavalry should really be laid upon the General's shoulders. A proper degree of freedom should be allowed to mounted troops, and yet the General-in-Chief should not let his cavalry Divisions get out of hand. Whereas it was formerly the custom to hold back the cavalry masses as reserves, or to be used in pursuit of the enemy, the inclination now is to send them on far in advance from the very first, thus possibly producing the disagreeable consequence that the cavalry, when afterwards required for some purpose or other, is found to be quite used up. You should have a distinct object in view both in sending forward your cavalry Divisions, and in choosing the direction for their advance, and the General must not only know himself what end he means to gain in each particular case, but he must also make his intentions perfectly clear to the cavalry. Success in reconnaissance depends much upon the nature of the task assigned. The order so constantly given that the cavalry will advance to ascertain the strength and position of the enemy is quite useless, because this order only indicates the self-evident mission of the force. If, on the other hand, a General assigns to his cavalry, as is frequently the case, the duty of making out the enemy's designs, he is imposing upon it the very task which properly devolves upon himself. In either case the apparent helplessness of the chief will react upon the cavalry

and produce a want of confidence in their performance of the duty. The best plan is to require of the cavalry a reply to the questions which seem to the commander of the most immediate importance; for instance, whether the enemy's camps are visible in this or that place; whether this or that village is occupied; whether the enemy's advanced troops or main body have yet reached a certain line; whether movements of troops or of supplies are taking place on a certain named railroad or high road; and so on. Such definite instructions cannot be misunderstood, and will result in clear reports, which will enable the General to form his own conclusions as to the strength and position of the enemy and to divine his intentions. Combats and battles are very useful for obtaining information, as both sides are thus brought into contact for a considerable time and come to know one another. The mere desire to obtain information has often been the inducement to risk an engagement, though seldom a sufficient justification for doing so. The victor, of course, gets much the best of the exchange, remaining, as he does, in possession of the field on which he finds much to complete his information. The uniforms of the dead and wounded show what corps are opposed to him: reports, official documents of all kinds, are found upon the corpses; sometimes an office wagon is captured; in short, the trophies of the fight throw plenty of light upon those portions of the enemy's force which have been engaged. Sometimes even more is gained in this way.

A letter of recommendation from Gambetta, which the Irish adventurer, Captain Ogilvy, shot on the 24th November, 1870, had on his person, gave the staff of the IInd Army a valuable insight into the immediate designs of the "Government of National Defence," which was then planning an advance on Fontainebleau for the purpose of relieving Paris. A battle evidently affords a better chance of meeting with such a piece of luck than do marches and manœuvres. On the other hand, the amount of information gained by a battle is often disappointing—for the enemy disappears from view immediately after the action—thus breaking the thread of intelligence which we have been laboriously spinning. We should learn more were it not for the fact that the strife of battle completely absorbs the attention of those engaged in it, and even interests those present who are not taking an active part in it to such an extent as to prevent them from minding their own business. At the same time, if the main body of a cavalry Division is driven back by superior numbers, it by no means follows that the whole chain of patrols must needs retire with it: on the contrary, this is just the very time when they have the best chance of uninterrupted observation, the enemy's attention being otherwise occupied. The action of spies may be useful during the period of preparation, when the ordinary channels of communication still remain open, and when all does not turn upon instantaneous intelligence, as during the progress of a battle. During active operations and actual fighting, it is only the very latest intelligence which has any value, and this a spy has not the means of furnishing. He cannot correspond by telegraph with his employer, and in order to communicate by word of mouth, he is bound in common prudence to take a roundabout way, so that he will always arrive too late. But when the armies come to a standstill—for instance, during a siege, or an attack on a strong position—the spy may play the same part as in former days, when it was customary to gain over some man of respectability, attaching to his person a clever spy, who, playing the part of coachman or valet, would gain access to the enemy's camp. Such complicated arrangements are now rarely practicable. Exhaustive reports from intelligent spies may indeed still be very desirable from time to time to afford a survey of the enemy's situation, an insight into the disposition of the nation and of its army, information as to the state of his preparations and of his finances, and so on, but it is not easy to find persons of sufficient culture

for such a difficult mission, and it often happens that people of this description are obliged for their own security to have friendly relations with both belligerents; so that while getting news of the enemy, you are at the same time putting him in the way of getting information about yourself. We need hardly say, after our remarks upon "plans of campaign," that the legendary spy who dashes into camp on a foaming steed on the eve of battle, to present the General with a detailed description of his adversary's plan, is just a hero of romance and nothing more. The press is a valuable source of information, not only that of the metropolis, but also small provincial papers. At the same time, we must bear in mind that however well informed a journalist may be, he will neither be able nor willing to make the situation of his friends fully known, but we can get at what is worth knowing by putting together a quantity of trifles. It often happens that light has been already thrown on the picture from other sources, so that but one more puff of air is required to tear to pieces the thin veil which drapes it. The presence of some in high command may be mentioned, a letter may be published in which the writer names a corps and its station, or a feat of arms may be described with minute details as to its incidents, including the names of regiments and commanders engaged. Each separate detail, though in itself inconclusive, may yet be a valuable link in the chain which leads at last to the goal. If, in addition, we get hold of letters and collect statements made by prisoners, by residents and by travellers, we may arrive at certain important conclusions. The press cannot be too careful in time of war. Those who conduct it should strive resolutely against the thirst for news when this cannot be indulged in safety, whilst at the same time they must humour it within these limits out of deference to public opinion. It will be well to entrust reliable persons with the duty of diffusing throughout the country all intelligence worth imparting rather than by damming up all sources of information, to encourage those who are irresponsible and unreliable to take the matter in hand. King Frederick once acted as reporter for his own headquarters, and Scharnhorst proposed to start a special military paper to spread the knowledge of distinguished acts of valour and war news of all kinds. Whatever you may do, it will not answer merely to show want of confidence in the press; you must rather try to guide it into the right course. International intercourse will henceforth continue to be carried on in war. The power of the commercial interest is not to be despised. A saying is current, which is not very flattering to us, that the Germans will do anything in the world for money. But this saying applies no less to other nations. The hope of gain overcomes many an obstacle which would appear otherwise insurmountable. Napoleon, who knew very well that the commercial world is always well supplied with private information, ordered Marshal Berthier on the 3rd September, 1806, before the war, to have all letters arriving at Augsburg and Nuremberg from Prussia opened, so as to find out what was going on in that country. In these days all communication is of course facilitated by the telegraph to an extent never before contemplated, and almost all the delay consequent upon the use of circuitous routes is thereby removed. For instance: General v. Manteuffel was engaged on February 1, 1871, in a sharp affair with the rear-guard of the Army of the East, which was retiring by Pontarlier to the Upper Jura. On the morning of that day a telegram was despatched from Berne to the Minister of the Confederation at Berlin, announcing the entry of the French Army upon Swiss soil. This message was forwarded to the former headquarters of Manteuffel at La Barre, near Dampierre, whence relays of messengers carried it by mountain roads, slippery with ice, to the General's new headquarters at Pontarlier, 12 miles distant (54 English miles), reaching him on the night of the 2nd. This was the first official notice received by him that the enemy

had given up the game, for the mountain valleys had re-echoed till long after dark with the crack of musketry and the dull reverberation of cannon. Many despatches have been conveyed with equal expedition through neutral territory to the theatre of war. Embassies, agencies in foreign countries far from the scene of action, may thus render great services to the Fatherland. International telegrams should be examined carefully by the Staff. The enemy's telegraphic system has sometimes been utilized on the theatre of war. During the campaign on the Loire the Germans discovered by certain symptoms that the French had tapped their wires and were reading their telegrams, and they soon played the same trick in their turn. The more artificial methods of obtaining information—such as by balloon reconnaissance, balloon post, heliostat, subterranean wire, pigeon or dog post, bottle post down stream, as attempted by the garrison of Metz for the purpose of communicating with Thionville, &c., all such dodges belong more to siege than to field warfare. The latter will in future require too much movement to allow fair play for such measures which will only be feasible when there is a temporary check in the operations. The organization of the system of reporting military news in your own army is of considerable importance, for it may very well happen that the sum of intelligence actually available is quite sufficient, if collected together, to clear up the situation of the enemy; whilst the General-in-Chief is all this time without the most necessary information on the subject. In the first place, it is difficult for subordinate Officers in contact with the enemy to decide in all cases whether what they remark is of importance to the higher authorities, besides which Officers of the lower grades often form a very incorrect idea of the omniscience of the Commander-in-Chief, and wrongly imagine that whatever they have to communicate has long before been brought to that Officer's knowledge from other quarters. Those who are not directly entrusted with the duty of obtaining information will often be prevented from giving any by a sort of modesty, a fear lest they should be suspected of false ambition. Moreover, every one is taken up with himself and with his own special duties. He makes the most of any intelligence for his own purposes, and is apt to forget the duty of passing it on. The more acute the crisis, the less frequent the reports, because those who should make them are fully occupied. There have been numerous instances in war of a Commander-in-Chief expecting news with anxiety from his Generals, who were all the time in possession of the necessary information, but neglected to communicate it. It may be accepted as a rule that the commander should take measures for providing himself with all the intelligence which he requires, by which we do not intend to imply that every Commanding Officer should send patrols and Officers right up to the enemy on his own responsibility. He should rather make full use of the information obtained by others. At the same time communication between different portions of the army should be carefully organized and strictly maintained, the Commander-in-Chief always sending Officers of his Staff to the Army Corps, whilst the latter have their representatives with the advanced guard, with the outposts and with the cavalry in advance of the army. These emissaries should on no account be employed in command of troops, as they should devote themselves entirely to their function of news providers. We have already pointed out that it is necessary to detail a special Officer at headquarters as the head of the Intelligence Department, lest the apparatus should break down at the moment when most needed; that is to say, when the Commanding General and his Chief of the Staff require every assistance to distinguish the truth amidst the mass of doubtful rumours. As a general rule, you will get more by carefully sifting reports from various quarters than by obtaining through good luck a very exhaustive report from some one quarter. It is clearly a work of con-

siderable labour to sift and collate materials, besides making a preliminary critique of the same; for, as a general rule, the golden grain lies buried amidst heaps of chaff. The work of the Intelligence Department requires excessive industry. When many thousand letters, written on little strips of thin paper, fell into the hands of the troops beleaguering Metz on the capture of a balloon mail, at first sight there appeared to be nothing worthy of notice upon them, for they had all evidently been exposed to official scrutiny before despatch. When, however, they had at length been put in order, when the names and addresses of the senders had been compared, a pretty clear picture was afforded of the distribution of the enemy's forces within the forts and of the situation of the various camps, as well of the disposition of the besieged. The Officer who examines such correspondence should not seek for perfect accuracy, but allot to each piece of information its own appropriate value. Intelligence, dating from a period when peace still reigned, comes in from embassies and agencies. These communications soon cease. Newspapers and printed documents of all kinds take their place. Spies make reports upon the state of public feeling, and give a more extended view of the situation, together with observations upon the enemy's designs, in which hearsay is blended with the reporter's own appreciations. Reports from the front, and especially from the cavalry, first give the necessary consistency to what has been already obtained in other ways, serving to confirm and to develop previous information. The most difficult part of the work still remains; that is to say, a just appreciation of the intelligence which has been acquired. The military historian usually only takes notice of what afterwards proved of importance, and when one reads such pieces of information apart from the trash with which they were mixed up at the moment of receipt, it appears to one often incredible that any doubt as to their value can have existed. But we must picture to ourselves how the real facts were enveloped in falsehood, confusion, and uncertainty, in order to understand how difficult it was to pick out the truth. A General should generally be guided by the law of probabilities if he wishes to base his own plan of action upon the jumble of reports. He should give even an enemy credit for acting in a reasonable manner; on the other hand, a too strict adherence to belief in what seems probable and an obstinate disregard of contrary appearances easily tend to foregone conclusions and to fatal error. How often does the unexpected occur in war! One should therefore always admit to oneself its possibility and not leave it out of sight; nay, one should believe in it on the recurrence of evidence which seems trustworthy. Hence we see the necessity of having a strong opinion of your own, and at the same time sufficient elasticity of disposition to admit of your being converted to a different view, though it is impossible to lay down a fixed rule as to the proper epoch for such a change; that is to say, the General should be able to form an opinion of his own and stick to it till doubts, based upon evidence directly opposed to his views, arise and gain the day, or, in other words, alter his mind. The natural peculiarities of the enemy, the personality of their Commander-in-Chief, the probable state of feeling on the other side, all these points should be considered, for they each have their influence. A thousand circumstances must be taken into account, and yet the General must not long hesitate. He should neither be too ready in belief nor too obstinate in mistrust. Powers of imagination to complete the picture from the outline and psychological insight which enables one to go to the root of human peculiarities are necessary qualities, in addition to professional knowledge and experience. As the doctor forms his diagnosis, not from each individual symptom, but from the general condition of the patient both physical and mental, so also should the General know how to draw his conclusions about the enemy from the sum total of evidence. Eminent powers of this kind are innate. Experience may sharpen the eye, but cannot create it.

Marches, Expeditions, and Quarters.

Slowness and weariness characterize the movements of large bodies of troops. You realize this fact when, after the band has ceased playing, you get a near view of the individuals composing the mass instead of that distant glimpse which Clausewitz supposes.[1] Here one poor fellow limps along with heavy knapsack on back and rifle on shoulder, struggling to keep up, and you can hardly help fancying that you yourself feel the pains which an ill-fitting boot inflicts upon his poor galled feet. Another struggles on with forehead bathed in sweat, and with pinched features, which clearly show exhaustion. Here and there a man completely worn out and near his end is led aside and breaks down entirely. From hour to hour the train of men, horses, and carriages creeps on with greater slowness. Everything is wrapped in dust, so choking that eyes and lips can hardly be opened. The sun has no mercy, shooting its burning rays without pity against the mountain side along which the road winds, and thus generating insufferable heat. The head of the column alone can move with some rapidity, the further back you go the greater the apparent fatigue; here no songs are heard. The longer the column, the more encumbered with guns and wagons, the greater its unwieldiness, the more frequent the stoppages and involuntary halts. The smaller the body of troops, the more easily and comfortably it moves, and therefore the more rapid its progress. The imagination of the aspirant to command, who is learning war from books, requires correction in nothing more than with regard to the speed with which large masses can progress. Giving the rein to his fancy, he directs his columns on the map, after rapidly forming his plan, first to one place, then to another, making them reach points of importance very quickly, so as to occupy these posts before the enemy can arrive, after which come deployment and attack, the steps following one upon another without interruption. But should this ideal future be converted into matter of fact, you will then see how far actuality lags behind intention.

The columns advance at a pace the slowness of which is very trying to the patience, and the fear that the enemy will be the first to reach our objective grows stronger every minute, for imagination lends wings to the foe, whose movements we cannot follow so closely as those of our own people, and in our fancy we see him striding on at a great rate. It often happens too that orders to march have been delayed too long, and that the time required for the movement has been underrated, but the inexperienced leader has no power of imparting to the masses the fire which burns in his own breast. The heavily-laden foot soldier looks with much indifference at the Officer who harangues him from the saddle; the most he does is to step out a little while the chief is close at hand, soon, however, resuming his former rate of marching, for he knows by experience that if he always answered to such appeals with extraordinary exertions he would soon come to the end of his strength. It is terribly difficult to rouse up the whole column out of its snail's crawl; nothing will do so but the thunder of the guns, which is sure to quicken the steps of the brave. The wonderful difference between the marching performances of troops on different occasions is very remarkable, and not always to be explained by differences of nationality and of quality. A march of 2 or 3 miles, hardly noticeable on the map, at one time almost uses up a body of men who on another occasion accomplish a march of double the distance without apparent distress. Wind, weather, state of the

[1] The author here refers to a picturesque passage which he quotes from Clausewitz, and which I have omitted.—L. G.

roads, condition of the men, after-effects of a previous state of things,[1] habit which affects this branch of military work more than any other, lastly, the personal influence of the Officer who is demanding those exertions of the men, are all factors in this case. Assuming 3 miles (13½ English miles) to be a day's work which the soldier will perform under ordinary circumstances in six hours, although under difficult conditions he may take eight or even ten hours to accomplish it, the whole day being thus taken up, we yet find Buonaparte doing this distance with his army for seven consecutive days, in the high mountains too, when crossing the St. Bernard. On good ground, 5, 6, or 7 miles (22½, 27, 31½ English miles) were not considered by him excessive distances for whole Army Corps to get over in a day. Murat's cavalry did more than 4 miles (18 English miles) daily for weeks together when following up the Prussians in 1806.[2] In later campaigns we find performances equal to and even greater than these frequently recorded on certain days. On the afternoon of the 16th December, 1870, the 9th German Army Corps stood at "La Chapelle Vendômoise," between Blois and Vendôme, in readiness to move. When it became known that the German position on the Loire was threatened, Prince Frederick Charles put this corps in motion towards dusk on Orléans, 9 miles (40½ English miles) distant, although it had before reaching "La Chapelle" already marched 2 miles (9 English miles), and had afterwards spent some hours on fields soaked with rain.

The roads leading to Orléans were bad, having been newly metalled; moreover, wagon trains which were following the IInd Army met them and delayed them in their progress. Yet the Army Corps reached Orleans next day at noon without any loss worth mention, 10, 10½, 11 miles (45, 47¼, 49½ English miles) in from 33 to 36 hours, including a halt at night as well as the time spent at "La Chapelle." One battalion in this column could boast that it had not left one man behind. Only 13 horses out of 4,000 broke down. This feat compares favourably with the best performance of any period.[3] Suwarrow marched from the neighbourhood of Alessandria to the Tidone in June, 1799, a distance of 11 miles (49½ English miles) in 36 hours. In November, 1807, when Junot made his dash on Lisbon, he marched the 35 German miles (148 English miles) between Salamanca and Ciudad Rodrigo through Alcantara in only five days over an inhospitable country and amidst heavy snowstorms, continuing his advance on Lisbon in the same

[1] Such conditions, for instance, as made themselves felt in the march of the IInd German Army from Metz to the Loire. Although the daily marches were not at first long, although the weather was pleasant and the roads good, a considerable number of men became non-effective, for the whole army had passed through a very severe and trying time, suffering hardships of all kinds just before the capitulation. Although later on, "the marches became much more severe they did not produce the same bad effects, because the men gradually recovered their tone and the habit of marching."

[2] Murat marched, in the first instance, in pursuit of Hohenlohe from the field of Jena to Prenzlau, then in pursuit of Blücher to Zirbeck, thence through Posen to Warsaw, which he reached on November 28, after marching altogether 188 German miles (846 English miles) in six weeks (about 20 English miles a day).

[3] The 14th Infantry Regiment made a remarkable march between the 4th and 16th November, 1870, from the neighbourhood of Metz to Paris. It was escorting trains, ammunition columns, and artillery of the 11th Army Corps, the greater part of which was despatched by rail, and it got over 42 miles (178 English miles) in thirteen days. 136 men became non-effective from all causes during the whole period out of a total strength of 2,547 men. It should be noticed also that the regiment had lain before Metz since 18th August, and therefore had all that time no regular practice in marching. The 10th Army Corps marched to the battle-field of Vionville on 16th August, 5 miles (22 English miles) and the 11th Army Corps to that of Gravelotte, from 5 to 6 miles (22½ to 27 English miles).

manner, but his army in so doing suffered such loss as to be almost entirely dissolved. We might cite examples from ancient history, but these are always somewhat doubtful, not having been exposed to the rigorous criticisms of modern historians. The instances quoted are, however, numerous enough to prove that one would be liable to great mishaps if one were only to reckon upon average rates of marching, for there is a wide margin for error.

One consideration alone is sufficient to account for the great superiority which the better marching army of the two has over that opposed to it, namely, that the commander of the former is always able to concentrate his forces more quickly than his adversary and to attack him with superior numbers. Hence arose the well-known saying that you can vanquish your enemy with your boots. During a combat a momentary impulse may work wonders, but it would have no effect during a long and severe march. It is very difficult to urge on a body of men who are beginning to get tired, even if vigorous measures be adopted, for as soon as you find some hundreds of men lying in the ditches, severity becomes impossible, and those who don't choose to go any further may throw themselves down and fall out with impunity. You may form a good estimate of the quality of the troops from the number of stragglers during a hard march. The influence of discipline shows itself clearly on such occasions. How much each individual may contribute to the general result is shown by the many examples of armies which, although inefficient in other respects, have after defeat shown an astonishing amount of solidity and marching power. Fear of the pursuing foe and the instinct of self-preservation urge on at such times each individual, and thus increase the endurance of the whole mass. It is very desirable to keep the men in good marching condition in peace-time. Where military training is actively carried on in an army, the constant exercise obtained at field manœuvres, also in moving to and from the drill ground and the ranges, will keep men up to the mark; still it will also be advisable to make special marches to long distances solely for practice in walking.

Owing to the organization of the national armies of the present day, they are to a large extent composed in war-time of men who have not been in the ranks during the period of peace immediately preceding the mobilization. Still the oft-repeated assertion that on that account it is not worth while to knock troops about in peace-time is erroneous, for although men do lose the mechanical habit of marching when they leave the colours and return to civil life, the traditions of remarkable feats once performed still remain alive in their minds. Exertions which previous experience has taught them to be nothing out of the common way are more easily borne than those of which we have no previous knowledge. If we were to give up the habit of practising offensive movements and long marches in peace-time, the Army would lose the means of judging how much the human frame inspired by good will is capable of enduring without serious injury, and in consequence the demands upon the men's powers would be reduced from year to year, soldiers and Officers accustoming themselves by degrees to look upon what is really only a moderate performance as something remarkable, and such it would become in fact, but only in the minds of the performers. If a misfortune happens once in a way during the summer heats when a hard bit of field exercise is being performed, and a man, young and vigorous, falls a victim to sunstroke or to over-exertion, many a voice is at once raised to advocate, on account of what has happened, the abolition of field exercises, without reflecting upon the necessity of giving every soldier the experience which enables him afterwards to undergo the hardships inseparable from campaigning in a far better spirit than if he were a mere novice, and thus to bear them more cheerfully. If you omit every exercise in peace-time which might possibly cause a mishap to some individual you would be treating

soldiers very unfairly, for you would be rendering them helpless and weak in war, thus doubling their losses. The period of long marches of concentration, which in former days afforded the best opportunity for regaining the habit of marching, has passed away. In these days, troops march straight away from the railway station to the enemy. There is no opportunity for getting the men into condition before the commencement of active operations. Therefore the exertions at first required of them should be moderate. If the 9th Army Corps had attempted at the beginning of the war in the Palatinate the great march which it afterwards made and which we have already alluded to, it would probably have lost a third of its numbers. It is only after war has been going on some time, after liberal field rations and exercise have strengthened the muscles, and after the weaklings have been used up, that extraordinary efforts can with safety be demanded. Much of course depends upon suitable arrangements being made as to the march. It would take up too much space to go into details about them. * *

A soldier when on the line of march is less affected by the actual distance he has to travel than by the length of time he is kept under arms and with his pack on. Three, four, five, and even six miles (13½, 18, 22½, 27 English miles) are no extraordinary day's work for a good walker. Only think of the holiday trips which one has made in one's youth to the mountain top. It does not require a professional pedestrian, an Albanian, or a Spaniard to demonstrate that even 10 German miles (45 English miles) may be walked in a day, for plenty of German artizans and soldiers on furlough have done as much in their anxiety to get home. But it is quite a different thing to roam about in light clothing without constraint and at your ease from marching in the ranks buttoned up in uniform and in complete marching order. The time which the soldier spends thus accoutred should be limited to that which is absolutely necessary for doing the distance. All useless standing about and waiting should be avoided, to ensure which the arrangements should be varied so as to suit the different circumstances. The head of a column marching away from a large encampment must move off hours before the tail, and it would be a great mistake to make the whole force get under arms at the same time. If the troops have been cantoned on the previous night in a number of different villages, and it is wished, as used formerly to be the case, to rendezvous before marching off at some one spot, the battalions destined to bring up the rear of an Army Corps would have to remain five or six hours at the place of assembly. It is therefore better to collect them into small bodies according to the situation of their night quarters, and to make these groups defile by the bye-lanes into the highroads, and unite just as tributary streams join one another and by degrees form a large river. Careful forethought in making dispositions for the march have great importance on account of their effect on the *morale* of the troops. Every hardship which appears useless in the common-sense view of the soldier annoys him, but he will cheerfully bear even greater hardships when he can understand the necessity thereof. His feeling in this respect is generally founded upon reason, and is not a mere question of routine. Blücher's well-known saying, "Night marches are more to be dreaded than the enemy," is as little worthy of general acceptation as any saying of the kind, for with bright moonlight one can march on good roads without any difficulty almost as fast as by day, and even under unfavourable conditions good troops have in all ages made night marches without damage to themselves. The campaigns of Frederick and Napoleon furnish many examples of this. The German Army Corps, too, in 1870 marched on the 16th December well into the night so as to do some 4 or 5 extra miles (18 or 22½ English miles). The example of Werder's army has already been adduced, and how much a comparatively small force can accomplish by a night march was shown by Commandant Bernard when he pushed with his Chasseurs les Vosges from

Lamarche to Fontenoy near Toul to blow up the railway bridge. His little party of 1,100 men had to make use of bad roads, often, indeed, going across country, through woods, and over hills in deep snow on the night of the 18th—19th January, 1871, doing altogether 40 kilometres (25 English miles). He stood fast during the next night, being meantime disturbed by an alarm, marching on during the night of 20th—21st with 300 men a distance of 35 kilometres (22 English miles), and again 60 kilometres (37½ English miles) further on the night of the 21st—22nd, besides driving off the small German guard on the last night and blowing up the bridge. In addition to this, he and his party had to cross the half frozen Moselle river under difficult circumstances. What is really "worse than an enemy" in a night march is the disturbance of the night's rest, combined at times with long distances and bad food as was the case in 1806 during Blücher's march. During the same campaign L'Estocq's corps made many night marches, and this in winter, without damage to its efficiency.[1] Between the afternoon of the 2nd February and the night of the 7th, L'Estocq did over 20 German miles (90 English miles), chiefly along bye-roads covered with snow, and mostly at night. This does not include marches into cantonment and to the places of assembly. Notwithstanding all this exertion the little corps was able to make on the 8th February its famous march to the battle-field of Pr. Eylau, where it decided the fate of the day. The conventional dread of night marches, which cause them now to be looked upon as a sort of mortal sin in a military sense, requires to be eradicated. In future wars when great masses have to be moved in a small space, several Army Corps being obliged to follow one road, we shall not be able to dispense with night marches. When they are made, care must be taken that the soldier gets his full allowance of sleep, for he cannot dispense with it whilst undergoing the great physical exertion of field service. There is one thing worse than an occasional night march, and this is the custom of issuing orders too late, owing to which the men are as a rule kept awake late into the night. The same holds good of getting under way too early in the morning. The so-called soldier's rule[2] that it is better to march out of night into day than out of day into night is a mistake. If you do the former thing it means that no one has had his night's rest, whilst if you do the latter it signifies only that you get to your night's quarters rather tired. Meckel gives the right rule when he says that in the case of large bodies of troops they should never, if it can be avoided, commence their march before 6 A.M. in summer, and 8 A.M. in winter. Even then, each company, squadron, and battery will have to get under arms at a very early hour. Good order on the line of march makes things easy, and you should insist upon good order being kept from the very beginning, and not wait till disorder has commenced. But good order should be maintained simply for the purpose of lightening the soldier's labours; all annoying martinetism should be avoided. Extraordinary indulgences, such as carrying the men's packs for them, and such like, are justified by extraordinary circumstances. If such alleviations cannot, however, be allowed, once and for all, it is better not to spoil the men by giving them advantages which they will afterwards miss terribly if deprived of them. Military manuals lay great stress on the service of security when on the

[1] No troops have probably have had so much practice in night marching as the British in India, and some notable examples of both night and day marches might be cited from the history of the Mutiny.—L. G.

[2] I think that the "soldier's rule" is the right one, and that "it is desirable to get over a march as early as possible, to give time for camping, cooking dinners, and long rest." (See a paper on "Marches," by the late Sir G. P. Colley, when a Major and Professor at the Staff College.) To march out of night into day is disagreeable, no doubt, but, I think, less harassing to troops than marching out of day into night.—L. G.

march, but too much is made of this, for troops when on the march are quite ready to go into action. What we really require on such occasions is reconnaissance. We are looking for the enemy and we require information about him. We know that the cavalry Divisions which precede us are doing their best to obtain it. It is customary, too, for a separate advance guard of all three arms to precede the column, thus freeing it from apprehension of surprise. If shots are heard in front, if the column comes to a halt, if it is reported that the enemy is near at hand, uneasiness and disquietude will otherwise spread through the whole force. Both Officers and soldiers are affected and the movement is disturbed. If on the contrary an advance guard is half an hour's march in advance, it will take upon itself the consequences of all that may occur on the march, and thus the main body enjoys a happy feeling of security, for it feels that an obstacle must present itself which the advance guard cannot deal with before the rest of the force is called upon to act.

But the advance guard need not be strong. Formerly it was considered correct to employ a third or a fourth of the whole force on this duty. The propriety of this rule appears very doubtful, for by adhering to it the General loses all control over a considerable portion of his force, as he creates a command independent of his own.

The greater part of the cavalry is always attached to the advance guard, even when cavalry Divisions have been sent on in front; for none but horsemen can keep up a proper communication with the latter and transmit intelligence swiftly from them to the rear. This rule, however, does not hold good on impassable wooded mountains, or even in particularly intricate and roadless countries, mountainous and otherwise, or in passing through long and difficult defiles, in passes, or on causeways where it is difficult for a horse to move, and where considerable bodies of cavalry could not possibly operate. In such situations infantry must form the head of the advance guard. Some artillery will always be of use, for this arm will be the first to detect whether any obstacle thrown in our way by the enemy is in earnest or not. Even dismounted troopers pushing on, carbines in hand, may easily be stopped by a handful of determined men posted behind a barricade or on the outskirts of a village or wood, whereas gunners will lay the ghost with a couple of well-aimed shell or shrapnel.

Moreover, an advancing enemy will be more easily stopped and forced to show his strength by unlimbering a battery than by any other means. An advance guard only requires a small force of infantry. As before said, it must be strong enough to give the main body which is following in its footsteps time to form line of battle. The experience of the last wars has, however, taught us that the main body as a rule did not form up because, owing to the pressing necessity which existed for supporting the advance guard when already seriously engaged with a superior enemy, the troops had to be brought into action little by little and higgledy-piggledy. This went on as a matter of course. It is difficult to make out at first whether the opposition which an advance guard is going to encounter will be strong or weak.

A commander of an advance guard who halts as soon as the event appears to him doubtful will delay the advance, and must expect to meet with severe censure if after all the enemy proves not to be in force. Every good soldier prefers being blamed for excessive daring rather than for too much caution. Should the affair turn out badly in consequence of the former line of conduct he may still console himself by saying with Francis I of France, "Tout est perdu fors l'honneur;" but in the other event he has no consolation, and in an army with an inclination for active enterprise no Officer will be placed on the shelf at the end of a war because he has once shown want of proper caution if he has on the whole gained a character for daring and enterprise.

This is much more likely to be the fate of one who, though admitted to be well instructed and thoughtful, is considered somewhat too cautious.

Therefore we may be all the more certain that every courageous advance guard commander will in doubtful cases resolve to attack. If then he has besides cavalry and artillery a whole regiment, or even a brigade of infantry at his disposal, he has at once a strong inducement to try the fate of battle. What commander at the head of such a force would allow it to be said that he permitted the enemy to deceive and to stop him by a bit of bounce, or that he let a favourable opportunity escape of giving that enemy a serious blow? Better far to dare!

A combat can easily be stopped as long as only your cavalry and artillery are engaged. The latter are a longish way from the enemy, and the former can use the speed of their horses to get away if advisable; but it is more difficult to break off the action if infantry is once engaged, for it is not possible to recall at once all the scattered parties. If you succeed in stopping the fire in one place it breaks out in another.

Bugle calls can seldom be used on account of the misunderstanding which may arise amongst neighbouring bodies of troops. Then if you succeed at length in getting your own skirmishers to keep quiet, the enemy, who is in consequence no longer held in check, makes use of the opportunity to press forward, thus forcing you to resume hostilities in self-defence. And so it comes that after a good many alternatives the commanders see that things must be left to settle themselves. The stronger the force of infantry engaged the greater the impossibility of breaking off an action. For instance, if the commander of an advance guard has only a single battalion to dispose of he will be more easily induced to come to a halt on meeting with resistance, with a view to giving the Divisional or Army Corps Commander the power of deciding upon the line of action. No one can expect him to attack in earnest with such a small force of infantry, while at the same time this force is sufficient to overcome an opposition only intended to deceive. When the reconnoitring cavalry Division of an advancing force with the addition of one or two battalions and some infantry from the advance guard is not enough to force a passage, a really serious combat generally becomes necessary to overcome resistance, and the General had better leave this to be decided by the whole of his forces. We thus come to the conclusion that even in the case of a Division or of an Army Corps a single battalion will be enough to follow the mass of reconnoitring cavalry, affording, as it will, sufficient protection to the artillery of the advance guard unless this only consists of horse batteries which accompany the cavalry. If it is evident beforehand that the advance guard will have a special mission, such as that of quickly securing some position, it will naturally be strengthened, and its composition will be adapted to the purpose of carrying on a serious engagement.

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The best way of gaining time for the deployment of your main body is to push your cavalry well forward, so as to gain early notice of the enemy's approach, and to be able to determine in good time when and where it is best to form the line of battle. If it be necessary to gain time, it will be better to do so by bringing some batteries into action, thus forcing the enemy to deploy, than by engaging a large body of infantry. The former course commits you to nothing, while the latter course will quickly bring on a general action. The case is different when you are in retreat and wish to avoid fighting. Rear guards must be stronger, so as to be able, when favourably situated, to punish the enemy if he presses on too much, whilst the main body continues its retreat without interruption, but even in the case of rear guards an obstinate battle is a mistake, because the difficulty of continuing the retreat is thereby increased, and the consequent losses become

more serious; or else the main body is obliged to countermarch in order to disengage the rear guard, thus defeating its own object. It is only towards dusk, as a general rule, that a rear guard may engage in a serious combat without danger, because the enemy has not then time to make use of his superiority. It is, however, well to bear in mind that in our latitudes darkness does not come on all at once, and that an active enemy may do a good deal as long as there is light enough to aim. Artillery will therefore play an important, in fact the principal part, with rear guards as well as with advance guards. Its far-ranging and powerful fire is best suited to keep the enemy at a distance, which is the task of all rear guards, and the longer the guns remain in action the better they perform this duty. The risk thus incurred of losing some of them should not be regarded, and should never be considered a reason for limbering up prematurely. It will be wise to attach some batteries from the main body temporarily to the rear guard. The same considerations which regulate the relative position of troops of the different arms in advance and rear guards extend to the actual column of route. In rear of the cavalry comes a part of the artillery, that is to say, of the arm specially required to open an action, but the risk which may arise from the defeat of the cavalry and from the consequent penetration of the pursuing enemy into the column, to batteries, helpless as these would be in the line of march, has led to the custom of placing at least some infantry in advance of the guns. Of course all the artillery is not quite so far to the front, for in that case the infantry which is behind it would arrive too late upon the battle-field. The corps artillery of one Army Corps which occupies above 7 kilometres (4½ English miles) of the column must not be wedged into an infantry division, because the infantry in rear of the guns would not reach the scene of action for 1½ hours after that in front of them, and the Divisional Commander would have to do without half his force all this time. It is customary, therefore, to place the corps artillery between the two Divisions of the whole Army Corps in using one road.

Hitherto we have only had in view marches leading directly on the enemy, but we must now say something of those which pass across the front of his position or of his columns, such as are called flank marches. These have the credit of being dangerous and difficult enterprises. Military experience, however, teaches us that one may venture more in the way of flank marches than theory admits. Frederick the Great made a flank march at Prague round the right wing of the Austrians, and at Kolin all along their front. In those days it was difficult to move an army which had once taken up its fighting position, for it was not allowable to disturb the order of battle. There was, therefore, no great risk of counter-attacks on the part of the enemy, and the King, indeed, never had any dread of them. All is now changed. The separate portions of every army are now able to act independently, and can undertake with greater facility a counter-attack against any of the enemy's columns which may march across their front; but still even now, when a large body of troops has deployed, it is a matter of time to put it in movement in a direction not before contemplated. Before this can be done the right moment for action has very often passed by, or else the commander is at least doubtful whether it will not pass away before he can act, and therefore gives up the attempt. If the enemy does not undertake the flank march with his entire force, but leaves a part of it in position, we must take care lest when making a counter-attack we find ourselves between the two bodies, that on the march and that halted, thus getting into difficulties; and so we see flank marches in sight of the enemy succeed even at peace manœuvres.

The risk is greater if the enemy is already in movement while you are making the flank march, in which case it will be prudent to keep at a

greater distance from the heads of his columns, or to occupy his attention by bringing into action simultaneously troops distinct from those making the flank march. When moving straight to the front it is, as a rule, of no consequence whether you encounter the enemy and have to form up a quarter of a mile (over an English mile) nearer or further off. When making a flank march, on the contrary, you always have a distinct end in view, which you would rather gain without any fighting or delay. Thus all interference on the part of the enemy is inconvenient. You watch him with a certain degree of anxiety, and you thus become impressed with the idea that you are attempting a difficult enterprise. Besides which it is only natural that we should think more of a danger which threatens flank and rear than of one towards which we are advancing. The soldier when on the line of march assumes that his leader knows the enemy to be directly in front of him. If, however, that enemy appears suddenly on a flank, the men in general are apt to become impressed with the notion that they are surprised, an idea which shakes their confidence. Flank marches which even the private soldier can see to be intended as such are made with ease. This is proved to be the case by the numerous marches for purposes of concentration made within the lines of investment round Metz and Paris in 1870–71. Those were really all flank marches made in presence of the enemy occupying the ground in rear of and between the forts. But the situation was clear to all, and everyone knew that during the march attack was only to be feared from the side on which the fortress stood; hence the feeling of being in an extraordinary situation was dispelled, and the troops marched without apprehension along or close behind the line of investment towards the threatened point, the whole proceeding appearing to them quite natural, and no special precaution being ever taken on these occasions. Yet, to take an instance, at the time of the battle of Noisseville (September 1, 1870), the field works along the Prussian line were in many parts still very slight, and the position was in greater part only held by outposts, so that as large a force as possible might be available for field operations. An Army Corps on the march, if suddenly attacked in flank and obliged to show front to that flank, forms a fighting line 3 miles in length (13½ English miles), in which are various gaps more or less large, but you will hardly allow yourself to be so completely surprised as to be compelled to form to a flank on the actual road which you are following. There will always be time enough to gain a position on one side of the marching column, and in such a position you can form up more quickly than to the front, because the distances to be traversed are shorter. The tail of the column is, as we know, 24 kilometres (15 English miles) from the head, and the rearmost troops will only have 11 kilometres (7¾ English miles) to march to a flank position about 3 kilometres (2 English miles) from the line of route, on the assumption that the extent of the position taken up is 4 kilometres (2½ English miles), that the troops marching at the tail of the column will only have to gain the nearest flank of the position, and that the latter is neither near the head nor tail of the column, either of which cases will be of rare occurrence. The situation will be less favourable when, owing to the nature of the ground, it is impossible for troops to form up to a flank from column of route, for instance, in a narrow mountain pass, but the very nature of the ground in such a case will generally protect the marching column from interruption, for the enemy will find no roads by which to move to the attack. According to the rules of art, troops when making a flank march should be covered by a corps specially detached for the purpose, behind which the movement will be made, but the very presence of such a corps will very often draw the enemy's attention at once to the operation. The said corps, moreover, can only be one of small strength, and it will thus invite attack from the very enemy whom you wish to keep at a distance. Whenever,

therefore, the distance or the nature of the country are of themselves sufficient to give some security against attack, it will be better to dispense with the covering corps, and to content ourselves with keeping the enemy under careful observation by means of our cavalry. When a detachment is sent out as above supposed, it is often difficult to draw it in again safely, and the whole operation is therefore delayed. When, in 1866, Benedek made "his well-conceived" flank march from Moravia to the Upper Elbe, he placed the IInd Army Corps, which happened to be in advance, and the 2nd Cavalry Division in position fronting towards the country of Glatz, a measure which served to delay the whole operation. During the Napoleonic period it was held that a position taken up for battle should always be of great depth, which will seldom be the case if we have to repel an attack made on us whilst making a flank march, and are consequently forced to form up towards the flank, but in the present day we may dispense with depth of formation, as modern firearms give great power of resistance even to a thin line. The prejudice against flank marches should, then, be treated in the same way as that against night marches, that is to say, it should be overcome. When on some future occasion two armies form up opposite to one another on the frontier and in close proximity, the possibility of a first success will depend on rapid concentration on one point, which can only be accomplished by means of bold and rapid flank marches. This will be specially the case when we find ourselves in front of a chain of barrier forts, between which the enemy has taken up his position. Of course some caution is necessary in making a flank march. It will be advisable to shorten the column of route by diminishing the intervals between the different units, and by marching on as large a front as possible. Naturally, too, baggage and trains should not follow in rear of the troops when crossing an enemy's front, but take parallel roads near the column on the side furthest from danger. One may often take advantage of night for flank marches which would otherwise have to be made in view of the enemy. If a whole army is engaged in the operation, attention must be paid to the possibility of deploying in some strength to a flank at need. This would be a case in which one would be evidently justified in making two Army Corps follow one another at as close intervals as possible on the road nearest to the enemy. Further formations seem unnecessary. When the IInd Prussian Army advanced into Bohemia at the end of June, 1866, the VIth Army Corps followed the Vth on the exposed left wing, which to a certain extent was making a flank march across the head of the enemy's columns then coming up, the two corps being, as is well known, temporarily united under the command of General v. Steinmetz.

Clausewitz says that the wearing effects of marching are so great that next to battle it is the operation the most productive of loss. This is doubtless accurate. Thousands of men will always be used up on the line of march even if every care be taken. Napoleon lost, when advancing into Russia in 1812, during the fifty-two days which it took him to do only 70 miles (315 English miles), nearly 100,000 men by sickness and straggling. Bad discipline had in great measure to account for this probably, but in any case his losses on this march would have been extraordinary. Even if the men who fall out do not die, they are at all events lost for the term of the campaign, filling up hospitals and etappe stations on the line of communication, and causing serious embarrassment.

Prince Frederick Charles ordered all his stragglers to be formed into companies, and to be used as garrison troops in rear of the army in 1870, which turned out to be a very judicious measure, as it enabled him to keep units in the front which he would otherwise have been forced to leave behind, and moreover the hard guard duty made those left behind anxious to rejoin their corps. Although an Army Corps may in special cases far exceed the ordinary

distance of a day's march, namely, the length of its own column of route, a General should always carefully consider whether the gain arising from such an effort is sufficient to counterbalance the probable loss occasioned by it. A forced march must, from its material effects, be considered equal to a defeat if the enemy after all eludes you, as will happen, for instance, on eastern theatres[1] of war, and its after-effect morally is likely to be unsatisfactory, for you will have the consciousness of having made a great expenditure all for nothing.

The journeys of troops play their part now, as well as marches. In the olden times one only heard of sea transport for troops. Napoleon, however, to whom nothing was impossible, forwarded his Guards in 1805 and 1806, and the troops brought up from Spain in 1814, to the scene of operations in carriages. They thus got over on an average 10 miles (45 English miles) daily. Nowadays, as we have seen, millions of men journey to the frontier by rail when the armies are being concentrated. After war has actually commenced, transport of troops by rail on a large scale meets with serious difficulties, the lines being taken up with goods of all kinds, and the railway staff being reduced by mobilization. Moreover, a certain amount of lassitude creeps in after the extraordinary exertions made during the period of concentration. The rolling stock is dispersed. The approach of the enemy causes disquiet, and results are not unlikely to fall short of expectation. It is easier to bring up reinforcements from provinces which are not exposed to attack than to transport troops immediately in rear of or along the front line. As, however, considering the speed of railway transport, roundabout roads will not be of much service for concentration, we must be prepared for the sudden and direct transfer of large masses from one point to another on the line. The army on the defensive, being at home, has a great advantage in this respect. During the campaign on the Loire in 1870, 28,000 infantry of the French 15th Army Corps were conveyed from Salvois in the Sologne by Vierzon and Tours to Mer, near Blois, and to Vendôme, being thus transferred from the left to the right bank of the Loire, between 7 A.M. October 27th and 9.20 P.M. October 28th, without its being noticed by the Germans. 16 batteries, 2 regiments of cavalry, ammunition columns, &c., followed the infantry during the latter night up to 8 A.M. on the 29th. In November of the same year, 40,000 men of the three arms, under General Crouzat, travelled in eighty-eight trains from Besançon on the Doubs, to Gien on the Loire, in three days, this latter movement only becoming known to the Germans after its completion. From time to time during the campaign on the Loire, French military trains travelled at only ten minutes' interval. On the other hand, the attempt to transfer Bourbaki's Army with extraordinary rapidity from the Upper Loire into the valley of the Doubs, at the end of December, 1870, failed, owing to defective preparations and to want of unity in command. Two Army Corps and the general reserve, consisting of one Division, took three days to unload, and altogether ten days to complete their journey, which it was hoped to accomplish in half the time. An Army Corps, which followed the army later on, took from the 4th to the 16th January to get from Nevers to the Upper Doubs, near Belfort, because it found the line blocked by the unusual accumulation of trains conveying troops, material, and supplies.

It would have been better to have moved part of the army by road than to depend entirely upon rail transport, particularly in the case of the single line on the Upper Doubs, the smallness of the stations on which made detraining a long business, and the expeditious establishment of a second line of rails and of sidings was impossible owing to the small amount of space

[1] By *eastern* the author means *Russian*.—L. G.

between the river and the hill-side. The invader will find it even more difficult during operations in the enemy's country to shift large bodies of troops from point to point along his front, although he will naturally deem it advisable to repair the lines occupied by him, and to make use of them. We may mention, by the way, as examples of the use of railways in an enemy's country, the following occasions in 1870–71, when the Germans took advantage of the French lines. The 14th Infantry Division, whilst besieging the fortresses on the northern frontier, was conveyed, between the 7th and 14th January, 1871, from thence by rail to Châtillon-sur-Seine, the combatant portion being assembled at that place on the last-named day. Trains and columns followed. After the fall of Strasbourg, the Landwehr of the Guard Division was transported to Paris, beginning its entrainment on 7th October, and arriving by instalments at Nanteuil between the 10th and 19th. It was obliged to use the main line by Frouard, which was already in great request. In the same way, the 11th Army Corps was forwarded from Metz to Paris. The 3rd Infantry Division, consisting of 10 battalions, 1 squadron, 4 batteries, 1 pioneer company, 2 hospital detachments, 1 field oven column, 1 field hospital, 1 supply column, altogether 120 wagons, did the journey in twenty-four trains between the 3rd and 8th November. The 4th Infantry Division had already commenced its entrainment at Pont-à-Mousson on the 26th October at midday, the whole of its combatants, together with field hospital and the necessary columns, being assembled at Longjumeau by the 6th November. A part of the corps marched by road to Paris. As a general rule, the railways will do little for an invader but bring up from the rear necessary supplies, ammunition, and drafts of men. The advantage to be gained by using the rail instead of marching is evident from the fact that while we reckon the ordinary rate of marching at 3 miles (13½ English miles) in the twenty-four hours, we may count upon doing 90 miles (405 English miles) in the same time at a moderate speed. The trial to the troops will, however, be somewhat greater owing to the loss of their night's rest. At the same time we must remember that troops are able to make a moderate march at the end of their journey, and will indeed generally be very glad to do so after sitting still for so long. The difficulty of transporting large bodies of troops by rail consists more in entrainment and detrainment than in the actual conveyance from place to place. When there is only a single line of rails blocks must frequently occur, so that in such cases you must reckon upon less work being done, and upon a greater degree of uncertainty in traffic than when there is a double line. The greatest number of trains to be counted upon daily on a single line is generally found to be twelve, whereas the number may be put at eighteen on a double line. Colonel Blume, however, after the experience of the war of 1870–71, considers it advisable to reduce the estimate to eight and twelve respectively.

This is certainly well within the mark, for it only equals what the French accomplished in 1870–71 on the occasions which gave rise to so much complaint as to slowness of movement. Whenever circumstances render it in any way practicable, transport by rail should be preferred to the route march, for casualties inseparable from the latter are inevitable, but a careful calculation should always be made as to which mode of transport is the quicker. You require on an average eleven days to dispatch an Army Corps complete on a railroad with one line, and seven days to do the same on a double line. The same corps can march 30 miles (135 English miles) in eleven days, 20 miles (90 English miles) in seven days.

It is only when the railroad extends to a greater distance that there is any saving of time in using it for a whole Army Corps, but it is very often only of consequence to convey part of the force expeditiously to a certain point, so you send that by rail, and the remainder of it follows on foot. It is often a

good plan to combine the two modes of transport, conveying the infantry by rail, and sending cavalry, artillery, trains and columns, by road, making longer marches than usual. Some guns and cavalry may be sent with the infantry, with a view to immediate employment on arriving at the end of the journey; in the same way, a small force of infantry may be despatched with the troops which march by road. The extraordinary services which railways render in provisioning and supplying an army, as well as for transporting the combatants, will always render it advisable for an invader to get the full use of them as soon as possible, therefore he will carry on the repair of railways which have been destroyed as his army advances. The construction of provisional supplementary lines, like that made in 1870 from Rémilly to Pont-à-Mousson so as to turn Metz, will in future be undertaken on a larger scale than heretofore. Railways are nowadays indispensable for siege operations, as a modern siege train can hardly be transported to any distance by road. Not to mention the weight of the guns, the mass of material required is so great that 20,000 horses, and as many men, would be required to convey a siege train without interruption to a distance of 20 miles (90 English miles). From 350 to 400 tons of ammunition are now fired away daily before a large fortress. The use of railways is therefore now a *sine quâ non*, for by no other means could such weights be transported to such a distance daily for any length of time.

The following figures give some useful hints as to the employment of railways in war. A train may convey one battalion, or something over one squadron (so that one may reckon three trains to a cavalry regiment of four squadrons), or one battery, or one supply column, &c. An Army Corps with its belongings requires 90 trains. An infantry Division without baggage requires 20 trains. A cavalry Division also without baggage requires the same number. From these data it is easy to calculate how many days any particular body of troops will require for despatch. An Army Corps will need, as already shown, 11 or $7\frac{1}{2}$ days, according to whether there be one or two lines of rail. Under similar conditions a cavalry or infantry Division will require $2\frac{1}{2}$ or $1\frac{3}{4}$ days. Now as a troop train does, as a general rule, at the outside 4 miles (17 English miles) in an hour, the length of time required to convey the various units to a distance of 100 miles (450 English miles) will be as follows:—

An Army Corps on one line of rail	12 days.
" " on a double line	$8\frac{1}{2}$ "
The advance guard of an Army Corps....	$2\frac{1}{2}$ or 2 days.
An infantry or cavalry Division	$3\frac{1}{2}$ or $2\frac{2}{3}$ "

As, however, the examples already cited from the Franco-German War show, the rate of travelling may at times be greatly increased.

Sea Voyages of Troops.

The transport of troops by sea has made no remarkable progress in spite of the rapid development of maritime communications. This remark, however, only applies to Europe. During the North American Civil War the transport of troops by sea played an important part. The Army of the Potomac under MacClellan, 80,000 strong, was conveyed by ship from Alexandria on the Potomac, to Fort Monroe on the James River, between the 17th March and the 4th April, 1862. The great amount of transport at the command of the Americans, and their energy in overcoming technical difficulties, alone made this possible. The most remarkable instance of the use of ship transport for troops to be met with of late in European warfare is in the case of the conveyance of the allied armies from Varna and Baltschik to the Crimea in

September, 1854. 60,000 men and 207 guns were transported in 330 vessels. All the preparations, however, for this great undertaking were made at leisure, and the operation was performed without any risk of interruption.[1]

There is really no great difference between the speed of steamers and a moderate rate of railway travelling, but no State can maintain a fleet of transports sufficient to convey an army. * * * * All Powers must therefore employ merchant vessels, mail-packets and other private steamers, and all these ships require a complete reconstruction of their internal arrangements to fit them for carrying troops, a work of time which is of itself a serious objection. * * * * Then loading and unloading are difficult matters. The large steamer, fit to carry a battalion, is too high out of water for shipping horses and carriages otherwise than by means of cranes, whilst the smaller steamers, such as those which ply on the German Ocean, are not roomy enough. A single infantry Division with the amount of columns and transport sufficient to fit it for independent action would require fifty such vessels, whilst the same number of the great Transatlantic steamers would carry an Army Corps. Every ship requires 300 metres of coast line clear to itself for the disembarkation of troops on an open shore ; therefore a flank of transports conveying an Army Corps would occupy a front of about 3 miles (13½ English miles). But as such extensive landing places are seldom or ever to be found the disembarkation must be carried on by degrees. First of all the men have to be transshipped into small vessels, boats and flats, to cross the shallows where the depth of water is still too deep to admit of wading. A change of weather may upset all calculations as to time ; it may in fact altogether stop the landing and a storm may even produce a catastrophe. Great fleets of transports are also exposed to attack, a danger increased by the uncanny torpedo. You must have complete command of the sea in order to convey a body of troops across it with any security.

And, after all, bodies of troops such as can be transported in this manner would play nowadays but an insignificant part in European warfare. The cost of sea transport too is enormously high. England alone can, in consequence of her wealth, her geographical position, and the great number of ships of the largest tonnage belonging both to the State and to private owners, perform anything of real importance in the way of transporting and supplying troops across the seas. Other Powers must confine themselves to exceptional efforts of this kind, only when no other means are available. Amongst those Powers France enjoys a considerable superiority. In February, 1871, the 22nd French Army Corps, consisting of 18,000 men and 10 batteries, was conveyed in a short time from the northern theatre of war to Cherbourg by sea. On the 16th July, 1877, 49 Turkish battalions, under Suleiman Pasha, were embarked at Antivari, and commenced landing on the 19th at the mouth of the Maritza. River transport may be very useful for the conveyance of infantry and especially for supplying an army. Frederick the Great, while carrying on his different campaigns in Bohemia, considered the Elbe to be the principal line of communication. The Commander-in-Chief of the IInd German Army organized in July, 1870, whilst the work of concentration was proceeding, a flotilla of six steamers and numerous barges intended to serve as a movable magazine on the Rhine, from Worms, by Mainz to Bingen. The boats were filled up with supplies

[1] This was not the opinion at the time of the Commanders of the allied forces. The Russian Fleet lay at Sevastopol, and still unsunk. It might naturally be expected to make an attempt upon the huge convoy, and the whole of the British men-of-war were therefore kept free from troops, so as to be ready for action.—L. G.

purchased in Holland (which country, however, soon closed its markets on the Lower Rhine), also in the district occupied by the army when concentrated, and from what could be spared by the fortresses of Coblentz, Cologne, and Wesel. Upon the advance of the armies into France, which soon followed, the cargoes of these vessels were made over to the great magazines at Bingen and at Worms.

The question of quarters is most intimately connected with that of marching and conveyance. The soldier who after a fatiguing march finds a good resting place recruits his strength and prepares himself for the next day's work, whereas if he remains in the field exposed to wind and weather he may become unfit for further exertions. A wise attention to the question of quarters for your troops is the best method of diminishing the loss which is caused by the fatigues of a march. We have now reached a pitch of civilization which disinclines us to accept the forest as our sleeping place and to turn night into day. If we were at once, on the outbreak of war, to assemble our armies in camps we should soon wear them out without firing a shot. We have only to remember how our men suffered during the first rainy days of August, 1870. If circumstances require it we must of course not dread the bivouac, but it remains all the same an evil, and in future care must be taken to keep troops as much and as long as possible under cover. This is particularly important at the commencement of a campaign, when so much has to be done to get things into order, and when the greater part of the men have to be accustomed once more, little by little, to a soldier's life. The worst quarter is always better than the best bivouac, but at the same time bad quarters are detrimental to the condition of an army, and an avoidance of them is by no means a sign of effeminacy but the outcome of very sensible views. Whoever has seen war knows how soon resources begin to fall short in a place through which armed hosts are crowding. Shops are emptied and closed, supplies are exhausted, trade comes to an end. No refreshment is to be found in the overcrowded quarters by day nor repose by night. It is therefore necessary to spread the troops over a large district, the extent of which is measured by the wealth, the occupation, and the habits of the population. In a flat and purely agricultural country we may reckon as a rule upon finding comfortable quarters for one man per inhabitant, but in manufacturing places, mining districts, and in the larger towns the case is different. Berlin, for instance, with its population of one million, would never be able to lodge a million soldiers, whilst a fairly well-built village would accommodate a number exceeding that of its inhabitants. You require on an average an area of from 8 to 10 square miles to quarter an Army Corps (162 to 200¼ English square miles); that is to say, equal to the square of the length of its column on the line of march without heavy baggage. When a body of troops is bivouacking it is certainly put into motion with greater facility. A quarter of an hour should suffice after the order is received, and if the troops are to march off at once on a broad front without in the first instance getting into column of route there will be a great saving of time. When troops have to be brought to the rendezvous in small parties, drop by drop as it were, from scattered villages, they must be formed up into units before the march commences. Again, when encamped, the men are spared the fatigue of marching to and from their quarters, but notwithstanding all these advantages the case must be of a very peculiar nature for them to outweigh the objections to camping out. Amongst these we must reckon the fact that it is much easier for the enemy to discover troops in camp or bivouac, and to estimate their strength, than when they are in quarters, for on dark nights the glare of large camp fires is visible to a distance of several miles, whilst by daylight, particularly towards evening, you may see their smoke quite as far from sufficiently high ground. For instance, from

the church tower of Pithiviers, at the end of November, 1870, you could see very clearly when the sun was approaching the horizon the clouds of smoke from the great French camp near Gidy and Cercottes before Orléans, although 5 miles (22½ English miles) distant. Yet we can only forbid the men to light fires in very exceptional cases without causing them great suffering. Napoleon made his "Grande Armée," in 1812, bivouac during the whole of its advance from the Vistula to the Niemen, owing to which progress was indeed rapid, but the losses very great. The opposite error may be laid to the charge of the Prussian Army when retreating in 1806, on which occasion the troops were so widely scattered in villages and towns, on account of supposed difficulties of subsistence, that their marches were much prolonged and their night's rest was thereby broken into. The old fashion of encampment under canvas has been entirely given up because it necessarily entails one of these evils, either a large addition to the impedimenta or to the weight carried by the soldier. Nowadays, therefore, as soon as active operations are in full swing, it is customary to use only one system of quartering, namely, as soon as the day's march is over to divide the troops amongst all places within fair reach without caring whether ordinary rules are broken and without attention to statistical tables or occupation returns. Each unit settles itself in a village as well as it can. Men who can't get under cover have to remain outside, building themselves houses of branches or straw huts, or else finding shelter behind walls of houses or of gardens, making lean-to's with doors, planks, or such like. The name of "*Ortschafts-lager*," "village camps," has been invented for this kind of field location, and deserves to be retained as being very descriptive.

In former days camps were considered necessary with a view to security from surprise, as it was thought that if quartered in any other manner, the troops would not be formed up with sufficient rapidity in case of attack, but the only alternative for camps in those days was a very scattered cantonment. Since, however, we have learnt how to pack ourselves close together in buildings there is no longer any necessity for disturbing the normal tactical formations, and thus there is no cause for anxiety. It is inconsistent with the simplest dictates of common sense to encamp outside the very place which you must at once occupy if you are attacked. It is more reasonable to get into it at once. You can be quite as watchful and ready for battle inside a village as outside it. Each separate unit is quartered in a large building or in a farm, where it must make itself at home in good time, prepare the place for defence, and make ready in every way. Everyone will then be in his place, if the enemy appears, more quickly than if passing the night in the open field and obliged to turn out in total darkness. Care must, however, be taken that the troops are kept together in some sort of tactical formation, and that all are placed near the posts which they will have to defend. Even at very critical moments, when considerable masses are concentrated in a very small space, so that huts of straw and branches cannot entirely be dispensed with, as many troops as possible should be packed in the adjoining hamlets. The advantage of this measure does not merely consist in the fact that the men are sheltered from bad weather, but also in their finding in the houses cooking apparatus which simplifies the preparation of their food, an operation which in the open field and with defective appliances is always difficult, and in case of a high wind often well nigh impossible. The dust on the sandy fields of the March of Brandenburg renders all cooked food unpalatable even at peace manœuvres. Again, even in the most crowded places you can generally find a most acceptable addition to your rations, so that you gain both in respect of quarters and of food by being under cover. During the winter campaign of 1870–71 the German troops did not fear, even whilst battles were proceeding, to take shelter at night in the villages

and farms nearest to their posts. Such was the case at Beaugency, Le Mans, and on the Lisaine. If even a corps allowed itself once in a way to be surprised, and suffered loss in consequence, as at Beaugency, the damage done was not by any means commensurate with that arising to an army from being compelled to camp out permanently, in order to avoid such mishaps. The worse the season and the weather so much the more necessary becomes the occupation of "Ortschafts-lager" and of compact cantonments. A few bad nights passed without necessity in the open may well do as much harm as an unfavourable action, and are, at any rate, more damaging than an occasional night attack. The greatest difficulty will always be to get proper shelter for the horses, particularly in the case of large bodies of cavalry. In the case of columns and trains both men and beast may get some cover from the carriages. Every body of troops to which a certain place is allotted for quarters is naturally jealous of its temporary right of possession, and looks askew at any unbidden or unauthorized guest. As it is advisable to divide the different sections of every large place between the various units, the part to be occupied by each should be distinctly assigned to it, otherwise disputes will certainly arise. Egoism is sure to be displayed in the matter of supply and quarters. Therefore a distinct district must be assigned by the Commander-in-Chief to each Army Corps, whilst the commander of the latter allots to each Division under his command, to his corps artillery, to his trains, and to his columns, a special portion of the district for each to occupy. In doing this it will not be enough to draw boundary lines, it will also be necessary to specify to which corps each separate place is allotted. It will depend upon circumstances what form it will be advisable to give to each section occupied. The question will be what are you next going to do? Whilst on the line of march it will be best to mark out long shallow tracts of country, and to spread out your troops on each side of the main road which the column to which they belong is following. As we say in military parlance, the troops are écheloned on this road. It will do very well then if the rear troops of each Army Corps can take up their night quarters 3 miles (13½ English miles) from the head of the column, so as to follow in due succession when the column moves on. The trains and supply columns find shelter farther to the rear. It will depend upon the situation of the towns and villages what amount of lateral extension is taken. If any body of troops is placed more than a mile (4½ English miles) from the main road which it is expected to regain next morning, it should be credited with a full extra day's march, and had better seek a resting place to the front instead of on the flank. Troops will seldom be sent more than ½ mile (2¼ English miles) from the main road, and if sufficient accommodation is not found within this distance to make them comfortable, they must manage to rough it for one night. If there is a pause in the active operations, and a prospect of remaining in the same place for some time, the troops may be extended over a wider area. On such occasions a square or circular form will be preferable for the occupied region, with headquarters at about the centre, so as to have equally easy communication with all parts. The same course should be pursued when it is intended to receive an attack on the ground occupied, as the different corps can then be easily concentrated.

All arms will be represented in each village, so as to take full advantage of all disposable houses and stabling, but this arrangement entails a disturbance of the normal order of march which was adopted at its commencement, but which cannot be long maintained under the supposed circumstances. According to the situation of the different quarters smaller groups of all three arms will be constituted within the larger bodies; for instance, within the Army Corps and Divisions will be the brigades, each of which will comprise some cavalry and several batteries, which will be attached to them

throughout the march. The General in command will, however, be glad to keep his corps artillery together and free from intermingling with the other arms. But even so, useless marches of separate fractions of the force should be avoided as much as possible, for every movement causes, like battle, a certain expenditure of force. Every opportunity should be taken to restore the original tactical formation of all constituted units, as long as in doing so the men are not exposed to any special fatigue. In giving this sketch of arrangements for moving and quartering troops no allusion has been made to operations carried on in extensive wild tracts, badly provided with roads and thinly populated, such as, for instance, those traversed by Napoleon in 1812. In such countries it will be impossible to put the troops under cover, or to get any supplies from the places occupied. You will thus be forced to camp out, which will be all the more injurious in such an inhospitable country, owing to its raw climate. Hence it will be for a General to decide how far it will be advisable in such a case to make use of unusual means of shelter, such as the now obsolete tent, or if halted for any length of time, whether the construction of huts on a large scale may be resorted to with advantage. The great point, under such circumstances, is to keep the troops in good fighting condition. As they must be subsisted under such circumstances more by means of supplies conveyed with them than will be the case when campaigning in a fertile and thickly populated region, the whole of the provision trains must not be allowed to follow at the tail of the column, but a part of them must be attached to the troops and kept up with them. The arrangements for conducting a march, and for regulating the supply of those performing it, will make great demands upon the experience and ability of the Officers, especially those of the General Staff. There is much more marching than fighting in war, hence it becomes all the more necessary to take all possible pains to lighten the fatigue of a march.

Having thus treated of the manner in which armies are concentrated for action, it is now time to enquire into the mode of employing them in the constantly varying operations of war, and it is first of all advisable to consider the two so-called fundamental forms of fighting.

Attack and Defence.

"Offensive or defensive?" has always been a favourite theme for those who theorize on war, because the question, which form of action is the stronger, will continue to be attractive to the enquirer, as the answer may be modified on each occasion by the assumed conditions of the moment. Clausewitz says: "The defensive is in itself stronger than the offensive." Blume, on the other hand, declares that the "strategical offensive is the most powerful method of conducting military operations." Discussion upon this point seems generally based upon the supposition that belligerents have always the choice of offensive or defensive. On the contrary, this is hardly ever the case, for the situation of the moment almost always assigns to one side the offensive, to the other the defensive. It is, therefore, much more important to us to study the peculiarities of each mode of action than to compare the advantages and disadvantages of each.

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That both sides should assume the offensive is only imaginable in the case of a war between two States of equal strength and with equally good military organization. The difference of a few days in readiness for war will now-a-days be sufficient to force the defensive upon the army which is behindhand. Napoleon I, by his bold and rapid offensive wars, gave strength to the idea that the advantage is always with the attack. The progress which firearms of all kinds have made since his time gives rise now to the very prevalent

opinion that from a tactical point of view the reverse is the case, but as we shall presently show the strategical offensive is only now practicable if combined with the tactical offensive: hence, whatever disadvantages accrue to the latter, must needs be shared by the former. From this it would seem that he to whom the defensive appears to be dictated by the whole situation, and who is therefore tied to the passive part, will yet at once find himself in the better position of the two. This evident inconsistency proves that the belief in the greater power of the defensive rests apparently upon a misconception. It is no doubt true that in the battles of the present day the defender can sweep the ground to a distance of 1,000 metres before him with the projectiles discharged by his excellent firearms. The assailant has to cross a deadly zone ten times as broad as in muzzle-loading days. The shelter afforded by the ground, by strong posts or by artificial defences, tells in favour of the defender, who is at rest and prepared for the attack. His pieces may belch forth their missiles unceasingly, whilst the assailant must often interrupt his fire in order to advance under the most trying conditions. In doing so, he is exposed not only to danger and loss, but also to fatigue. The defender has a simpler task to perform. Unity of direction may be maintained on his side by those in supreme command, and there will not be nearly so many self-acting leaders in the field. It will be easier to keep up the supply of ammunition and to bring up all available resources, as a fixed position is held and it is not necessary to scatter and disperse the troops, to intermingle them, to change direction, to break off the action at one place and recommence it at another—all which complications are inevitable when making an attack. The defender is also certain of possessing some advantages beyond the domain of tactics. The question of supply, of bringing up reinforcements of men, horses, material of all kinds, is simplified, because the army will not be far from its base of operations, often, indeed, is falling back upon it, and the line of communication will not be constantly lengthening out as in the case of an attacking force. When on the defensive there will also be a larger force available, as certain categories of combatants may be used which an assailant cannot bring into play: for instance, the garrisons of fortresses within the bounds of the theatre of war which neutralize some part of the enemy's forces, even if these be only required to remain in observation. The assailant, on the other hand, cannot bring garrison troops to the front, as his fortresses must not be left unprotected, and the possibility of attack must be guarded against. Besides which, garrison troops are generally unfit for offensive operations in an enemy's country, though the defender may well make use of troops of this description in an enclosed country or in fortified positions; besides which, armed levies may render him good service, whilst the assailant is unable to bring forces of this kind into the field. Peasants and townsmen past middle age will readily take arms to defend their own homes, but not to join an army invading a foreign land. It is a fair argument, too, in favour of the defensive, that the assailant must expect to meet with more loss and undergo more fatigue than the defender. The former is exposed to the serious disadvantage of having his strength weakened in a much greater degree by his advance than is that of his adversary whilst holding his position. Again, the assailant is in an enemy's country, and must occupy it in force. He has to make his way through a more or less developed system of frontier fortresses, to besiege a certain number of them, or to observe them, each of which operations implies a deduction from the strength of the active army. As he advances, his lines of communication are prolonged, and become more difficult to guard. From day to day the army has to leave more and more small garrisons behind it to cover its communications, and at the same time the difficulty of bringing up supplies increases. Invading armies melt away like fresh-fallen snow in

spring time. Hundreds of thousands of men cross the frontiers, of whom, after a few months, only thousands are available for active warfare in the enemy's country. Napoleon, who in October, 1805, had entered upon the German theatre of war with 200,000 men, was only able, in spite of the utmost economy of strength, to bring 80,000 into action on December 2nd, at the decisive battle of Austerlitz. It will be, moreover, difficult for the commander of an invading army to keep alive the original enthusiasm, for the end seems to all to have been gained, and the preponderance over the enemy obtained by the first victories. The necessity which exists of constantly bringing fresh forces into play, and of drawing further upon your resources in order to maintain your advantage, and to keep what has been already won, will with difficulty be made clear to those from whom sacrifices are demanded for the purpose. The defender's position is different. As the invader presses forward, approaching nearer and nearer, the danger becomes more and more evident, whilst fresh resources become at the same time available. Extraordinary measures for obtaining recruits, arms, and money are justified by the circumstances. If the armies are backed up by a proud and hardy race, the defence may be virtually strengthened by the fact that the war has commenced badly. As instances of this we may cite the Northern States of America during the War of Secession, and France in the second part of the war of 1870–71. Yet, as a counterpoise to all these advantages on the side of the defence, there remains to the offensive a far greater power of stirring up the intellectual and moral forces of the army. The existence of this superior power arises from the fact that the assailant has the prestige of previous victory on his side, and knows better than the defender the particular objective at which he is aiming. He chooses this objective for himself, and thus obtains a specific direction for his intellectual efforts. His intellect is moreover rendered fruitful by the force of circumstances. Much gain accrues to the offensive from the mere fact that it generates more activity than does the defensive, for the more active of two otherwise equal adversaries will be the conqueror. The defender awaits the blow in order to parry it. He must remain in observation, and regulate his own action on that of the enemy. The impulse which drives the latter forward must necessarily be wanting in his case, whereas the active part falls to the lot of the assailant, and the decided feeling that such is the case, which quickly and surely communicates itself to the masses, works wonders. The demeanour of an advancing army is widely different from that of one in retreat, or even of one awaiting attack. The spirit of enterprise is promoted in the former, as this quality has far greater opportunities for displaying itself on the offensive than on the defensive. The former mode of action brings into play a far greater number of active agents. We know that the Commander-in-Chief only gives general directions, while subordinate Officers are expected to follow of their own accord the indications thus given, and to make the most of them. Each of those Officers, even those of the lowest grades, may become the principal actors in the drama if fortune places him at a decisive point. A line of defence a mile long ($4\frac{1}{2}$ English miles) may be extremely well selected but may yet contain a weak point, and he who concentrates his strength upon that point will gain the honours of the day, and the feeling that this is possible is the cause that an attacking army is always more impetuous. The number of chances of success, too, increases with the number of influences at work. A knot of men who have pushed forward right into the enemy's position becomes a magnet of attraction to all portions of the attacking force which are not already engaged. Just as the waters naturally converge to a breach in the dam, thereby enlarging the opening, so here also waves upon waves of warriors roll on to the breach which some bold stroke has made.

Success in attack is of double importance. A successful defence only shows that the assailant was not at that time and place the stronger party, whilst success in attack convinces the assailant of his own superiority. Moral influence weighs as much in war as material influence. Let anyone picture to himself a situation in which he is expecting danger without knowing when it will arise, and he will thus realize the feeling of an army which is on the defensive awaiting attack. The element of impulse is wanting to the defensive. The energies are fettered instead of having free play, and the soldier is apt to think that the army and its leaders are victims to circumstances instead of being able to control them.

Active movement is wanting to divert the thoughts. The consciousness that matters can only end well if the whole line is successfully maintained must have a disturbing influence upon the mind. There is no use in holding five-sixths of the position if the enemy carries the other sixth. Nay, it will be enough for him if he gains a flank so as to roll up your whole line. On the 18th August, 1870, after the defenders had held a position miles in extent throughout the day, a few battalions gained their right flank, and through their action, combined with pressure from the front, destroyed a small portion of the French right wing and decided the battle. There is this all-important difference between the position of assailant and defender, that the latter only conquers if he has the best of it all along the line, while the former triumphs if he gains the upper hand at any one point. This tells against the tactical defensive which has so many advocates more than against the strategical defensive, and accounts for the fact that the defence of mountain ranges and of rivers has rarely been successful. Neither the Danube nor the Rhine have stopped the advance of armies. The very isolation of all the separate detachments posted at probable passages is dangerous, but still more so is the conviction which exists that any of the detachments may be lost if one of the neighbouring parties gives way too quickly. A "timely retreat" gains a certain amount of praise, and the knowledge that this is the case impairs the energy of defence. The poet who makes his Generals dispute in the following manner after a defeat: "Your people fled the first." "No one stood. Flight was general." "No, sir, it began on your wing"—this poet had in his mind a defensive battle along an extensive front. In the defence of the Balkans, in the winter of 1878, a catastrophe befell the defenders at the only place where there was hard fighting. Jomini calls mountains "those impassable obstacles which are always overcome." Although the defensive may be, as Clausewitz has it, in itself the strongest form of action, of which the weaker army may avail itself with advantage when occasion serves, so that with the aid of the natural strength of the ground, supplemented by artificial works, it may attain, at least, the modest end of repulsing the foe, still, after all is said, the offensive enjoys the greater vital power. At the same time it must be allowed that during the last ten years the task of the assailant has become more difficult. The most strenuous efforts will now be needed to gain a decisive victory over the enormous hosts which the defender will in future bring into the field, and which the assailant will find established in a strong position, whenever such is to be found, flanked right and left by heavy guns.

A General will have to be more careful in weighing the chances of success, and at the same time more ready to dare than has hitherto been necessary. In future the assailant will not gain his point merely by a dashing attack or by threatening the enemy's flanks. He must first pave the way by preparatory movements, combined with combats, in order to deceive his adversary, he must then make use of artillery on a large scale, and acting by itself, meanwhile rapidly concentrating his masses on the decisive point, and thus preparing his attack, which he must then carry out with the utmost vigour.

Whilst up to this time it has been customary for five or six Army Corps to occupy the enemy in front, whilst another corps threw itself upon its flank, and proved sufficient for the purpose, this proportion will perhaps be reversed in the decisive battles of the future. The next war will doubtless produce episodes in which the strength of all parties will be strained to the uttermost, episodes of which no former campaign can furnish any clear idea. Yet all that we have said alters in no wise the prevailing views upon attack and defence. These views are not founded upon material but upon moral grounds; they have their source in human nature. Every additional difficulty which may arise will awaken fresh conceptions in the assailant's brain, will give him fresh strength, will sharpen his intellect, stimulate his enterprise, thus giving him greater power, while at the same time making fresh demands upon him. Happy indeed is the warrior upon whom devolves the part of assailant. To conclude, the annihilation of the enemy's power, which is the object of every battle, is only to be attained by offensive action. The advocates of the defensive, it is true, always maintain that this form of action should only be a temporary stage of battle, and that the defender should always follow up the repulse of his enemy's attack by a counterstroke which he should be prepared to deliver at any moment. In other words, the defender is all the time wishing to become the assailant, and is only biding his time till he can assume that character with a fair chance of success. This is an admission that the defensive has no pretensions to be considered an independent form of military action, it is merely an episode. No one would accuse a man who, on being assaulted, parries the blows aimed at him, with having taken part in a row. Nor can you fairly say of a belligerent on the defensive that he is making war, he is only undergoing it. To make war means to attack.

After these general considerations we will proceed to explain the conditions which seem to us necessary for the successful execution of an attack. It is certain that a greater expenditure of force, physical and moral, as well as of intellectual effort, is required of the assailant; hence unless he has a numerical superiority, the two armies being in other respects about equal, the *morale* of his troops must be such as to make them capable of being tried to the utmost. However numerous his troops, if they are of inferior quality, there are certain tasks which they should not be expected to attempt; for instance, an assault upon a well-defended post, which cannot be turned, and out of which the defenders cannot be manœuvred. Such posts can only be stormed by soldiers who are very brave, skilful, and well-trained for war. When such men are not forthcoming, it is, as a general rule, of but little good to renew an attack over and over again with fresh masses, for each separate attack will be but feeble, and will not overcome the resistance. One vigorous assault will be of more effect than ten feeble attacks, even if these follow close upon one another. The attacks of the French upon the line of the Lisaine on the 15th, 16th, and 17th January, 1871, afford an example of this truth. Further, as so much now depends upon the action of the subordinate leaders, no army can gain successes in offensive warfare unless the Officers of the lower grades are bold, experienced, intelligent, and accustomed to act on their own responsibility, besides which every member of the force should be animated with the desire of gaining distinction. Again, as the material force of the attack is from the first moment constantly diminishing, a well-regulated system of reinforcement is one of the conditions necessary for a successful offensive. An uninterrupted supply of fresh combatants must be kept up, and there must be found in these really good material equal to the unusually difficult task which devolves upon the assailant, from whom success cannot be expected unless he belongs to an army carefully trained in time of peace, and under a strict but at the same

time popular, military system. Without the former advantage the necessary intensity of power will be wanting, without the latter there will be no adequate means for keeping up that power. Quickness and continuity of action are the elements of the offensive to which there should be no interruption until the desired end is attained. Any pause is dangerous, because following upon extraordinary efforts of which reaction is the natural consequence. It is very difficult to renew an attack once interrupted whilst engaged in operations; during a battle it is almost impossible to do so unless fresh troops come up, giving an accession of strength sufficient to counterbalance the loss entailed by the previous cessation of excitement, so that the only thing which justifies a voluntary interruption to the attack is the certain expectation of considerable reinforcements. If an unassailable position presents itself, the most venturesome attempts to turn and threaten the occupiers are preferable to waiting for a favourable opportunity; otherwise the assailant will unexpectedly become the assailed, for the defender will naturally gain courage when he sees that the enemy does not dare to attack him; besides which it is not to the interest of the assailant to bring matters to a crisis where the defender is thoroughly prepared for him, on the contrary, he should endeavour to change the venue, and to induce the defender by the influence of his own mobility to move in his turn, thus producing a situation in which from its very nature the offensive should have the upper hand. An attack quickly conducted leads generally in the long run to a comparatively small expenditure of force, even if the tension be more severe for certain short periods of time. Quickness is of special importance in the tactical offensive. Frederick the Great teaches us in his general principles of war that "the sharper the attack the fewer lives will be lost." The gradual diminution of the strength of the attack as it proceeds renders the strictest economy of our fighting power necessary. Thus the assailant should confine himself to one object at a time, leaving meanwhile all others alone. His whole strength, physical and moral, should be devoted to the attainment of that one object. Throughout the tactical offensive, the assailant should make up his mind to make immediate use of every effort to gain the upper hand at the chosen point of impact so unmistakably that the enemy may have no chance of re-establishing his position there. It is only after having accomplished this that the assailant is at liberty to look about for some other work of importance. In conducting a strategically offensive operation it is necessary to devote all our efforts to the destruction of that part of the enemy's force the defeat of which is most likely to make us for a time masters of the situation, but there is yet another consideration to influence us in the choice of an objective. We must ask ourselves whether it is possible to accomplish at one blow the whole task which we have undertaken, or whether it would not be preferable to divide our efforts, aiming in turn at various objects, and thus in a way to undertake not only one but several strategical attacks, which may yet very well be made to combine in the attainment of some one great end. The extension to be given to each strategical attack must be calculated so as to be in keeping with the means available for the purpose. Wise moderation is in this matter the General's highest virtue, one which was wanting in Napoleon in the year 1812, and owing to this want he fell. The continuation of the offensive from Smolensk on Moscow in the second half of August was an enterprise of the most dangerous description. This last decisive portion of his undertaking was sufficient in itself for a second campaign in the spring of 1813, the winter being meanwhile devoted to preparation. Napoleon overestimated the power of his genius when he undertook to do the whole in one campaign. Alexander, on the contrary, when engaged in the conquest of Asia, showed himself a master of moderation in restricting the limits of the different stages of his

operations, whilst he kept at the same time constantly in view the furthest objective which it was in his power to reach. In the systematic conquest of the coast of Asia Minor, in the occupation of Egypt, before making a step into the interior of the continent, his genius showed itself to the fullest extent. He secured his retreat, strengthened his army, gained possession of great naval resources, then only turning his steps to the unknown East. He thus preserved himself from the fate of Xenophon, and this is the reason why the acute and far-seeing Roman called Alexander the only really great foreigner. The German Commander-in-Chief showed the same wise moderation in 1870–71 in desisting during the siege of Paris from a further extension of offensive operations in the French provinces, and in concentrating all his efforts on ensuring the capture of the capital. "General considerations make it imperative upon us to pursue the enemy after gaining a victory over him, only as far as necessary for the purpose of dispersing the bulk of his forces, and of preventing their reassembling for a considerable length of time. We cannot follow him up to his furthest strongholds, such as Lille, Havre, and Bourges, we must not seek to occupy permanently distant provinces, such as Normandy, Brittany, or La Vendée, and we must make up our minds to evacuate places already in our possession, such as Dieppe, and eventually Tours, so as to concentrate our forces at a few specially important points." Such were then the directions from headquarters. Only after Paris was in our hands, and the besieging army was thus left free to operate, the despatch of reinforcements to the other armies, being thus rendered possible, was it intended to take in hand the complete subjugation of the provinces if such a measure still appeared requisite. Had it not been for the restraint imposed by circumstances our forces would have been scattered, an inevitable reverse would have followed upon our brilliant victories, and possibly even the main object of the war would have been jeopardized.

Although, therefore, the assailant should pursue his object without cessation, he should not persevere towards an unattainable goal, but only so far as the means at hand permit. Voluntary restriction of the field of operations preserves a General from involuntary retreat. The assailant must secure his flanks and rear, not by detaching a considerable part of his force to cover them, but by striking at the foe in his front with the greatest possible vigour. Every detachment made for secondary objects is an evil. A most careful organization of the line of communications between the army and its base is of course necessary in order that supplies of all kinds sent from home may reach the army in front without delay. Napoleon was in this respect a model of foresight, expending a great deal of care and intelligence on the good regulation of the routes leading from the rear to his army, as he knew well that an invading force requires a constant accession of strength. Even in 1812 he showed no neglect in this respect, but even his gigantic preparations were insufficient to overcome the insuperable obstacles which presented themselves. The greater the decision, the confidence, the self-reliance displayed by the assailant, the greater his chance of success, if these qualities be accompanied by the necessary degree of caution. An invader has gained half the battle if he can impose upon the enemy. To mention two cases only: Junot's dash on Lisbon in 1807, and Diebitsch's passage of the Balkans in 1829, in each of which cases the power of the invader consisted entirely in the moral effect of his movement. At such times, however, timidity on the part of the enemy, or the able use made by the assailant of the effect produced by his boldness, will conduce to the desired result.

Defensive action makes much less serious demands upon the quality of the troops, and this saying especially applies to tactics. The soldier becomes more of a machine in defence than in attack. His post is assigned to him, and the part which he is to play is made known to him beforehand. The

two things demanded of him are to keep up a heavy fire and to hold out stubbornly, of both which things even the young and unskilled combatant is capable. Self-reliance, dash, and quickness are only demanded of him in a lower degree. It is at all events sufficient if a small proportion of the leaders are gifted with these qualities. On the other hand, serious demands are made upon discipline, which is, however, more easily enforced when on the defensive.

From all this it follows that armies with a comparatively small degree of efficiency, composed of men hurriedly raised to meet an emergency, and who would be incapable of delivering a very powerful attack, will yet do well enough when acting on the defensive. The difference between the two parts is so remarkable, that one often finds no resemblance between the behaviour of the same men engaged first in one, then in the other mode of warfare. The elements of the offensive are quickness and vigour, those of the defensive steadiness and tenacity. Whilst the assailant gains his object by sudden and powerful blows, the defender succeeds by temporizing and by a repeated renewal of resistance. Every commander on the defensive should take note of this from the first. Several lines one behind the other held against each attack with the whole force at the command of the defender impart much strength to his position. A widely extended theatre of war is of advantage to him, as demonstrated by the campaign of 1812. Whilst sound military organization and careful training in time of peace are less indispensable for troops which have to act only on the defensive than for those called upon to take the offensive, plenty of ready money and good national credit are necessary to maintain the former, so as to be able to supply the increasing and constantly renewed demand for fresh resources throughout the war. Further, as a country can rarely entirely supply from its own resources all that its armies require at a given time, a State which wishes to carry on to the end a defensive war with success, must either have friendly countries behind it which are open to it or else the command of the sea. A State not thus favoured can at the best only offer resistance as long as its own industry can supply the wants of the army, and we must also bear in mind that under the supposed circumstances its monetary resources will be constantly diminishing. Whilst the invader only derives from his fortresses the advantage of their furnishing good support to the organization of his system of communications with the rear, and of their protecting his magazines and depôts, we must remember that the defender's fortresses are of much greater importance to him by securing his flanks, and that he can take advantage of them either by forming the field army in line with them to oppose the enemy, or by making them bear the first brunt of the attack, thus weakening his opponents before the latter encounter the field army. The defender should realize the power of attraction which his main army has upon the assailant. It secures not only the territory behind it, but as long as it is unbeaten all the surrounding country as well. Detachments for the sake of securing certain points should likewise be avoided as much as possible by the defender as soon as the two armies are face to face.

We have seen that the attacking force is bent on movement, the defender may therefore reckon upon being very rarely attacked where he first takes up his position and prepares for battle. It is only when the geographical conditions are thoroughly favourable to him that there will be an exception. He must therefore be himself prepared to move and to transfer his forces quickly from one place to another. He should never be tied to one line of communication with the rear, but should be able to exchange it easily for another, and as he will be generally operating in his own country he will find no difficulty in doing this, at least in Western and Central Europe, where there is almost everywhere a comparatively complete railway system.

Preparations for battle should not be made only at one point, but at least all principal points of *appui* where the assailant may possibly appear should be prepared for defence, and the defender should be ready for resistance at all points. This has been very well attended to in France. The north-eastern portion of the land may be looked upon as one well-prepared battle-field, in which, wherever the field armies assemble, we shall find when war begins field works rise in one night from the ground between the already existing fortifications. As the assailant takes the initiative, the defender is naturally exposed to the danger of reaching the decisive point later than the former, hence it will be necessary to arrest his movements. This may be effected by counter-attacks directed against the enemy whilst engaged in carrying out his designs, but enterprises of this nature are always difficult, requiring as they do very accurate intelligence of the enemy, together with calm and determined generalship on the part of the commander who will take care not to be led away by the first successes into going too far.

Counter-attacks, which from their very nature take the enemy by surprise, are generally at first successful, but if the assailant keeps his head he will soon see through his adversary's intentions, will alter his plans, concentrate his forces, and at once take decisive action, so that if the counter-attack be pushed rather too far it may easily bring on the battle desired by the assailant, but not wanted nor provided for at that point by the defender, whose game is at once half lost. Less dangerous is the attempt to check the assailant's move by taking up a threatening position on his flank. Whilst the defender transfers the bulk of his forces to what he looks upon as the critical point, he may often without risk post detachments in such flank positions, calling them in afterwards before they are seriously attacked. It is clear from this that the defender should on no account rely on a merely passive resistance, as indeed the advocates of the defensive maintain, but that he should, on the contrary, resort at need to movement and attack, the latter course being particularly suited to the latter part of the battle, when the assailant has been repulsed, and when the next thing to be done is to follow up and overwhelm him. Then at last the time has come for throwing away completely the mask of the defensive, and for assuming the part of assailant.

Having thus taken note of some of the main features of attack and defence, it remains to us to consider a combination of the two forms of action, which many experts consider the highest production of military art. As the advantages of the offensive are chiefly displayed whilst in movement, and those of the defensive whilst in actual combat, it has been argued that the best course of all would be to act strategically on the offensive but tactically on the defensive. To carry out this idea you should at first push forward into the enemy's country, and gain points which he ought not to allow you to seize, thus obliging him to give battle, during which, however, you will maintain the defensive, thus forcing upon him the more difficult and costly part of assailant—*offensive* movements, *defensive* battles. A very good idea but difficult of execution, and hardly ever worked out in practice. As we have already remarked in treating of concentration it will not be possible in the present day to make any forward movement worthy of mention without coming into collision with the enemy. The offensive movements will thus necessarily at once produce offensive actions, and even when the decisive points have been reached the same will occur. Now, should the army acting offensively wish to resume the defensive and await attack, it would be restoring to the enemy the strategical freedom of which it had just at some trouble deprived him and surrendering the advantages which it had obtained. The sudden change can hardly be effected, moreover, without producing a bad impression upon the troops. But, above all, a General has by no means

so complete a command over the crisis as to be able to fix its time and manner at pleasure. Battle, like minor combats, will be the immediate consequence of strategical movements. It is, therefore, quite a matter of course that the advancing army should attack when it finds itself in front of the enemy, for battle then has a great attractive power, and the commander will rarely find it possible to prevent his troops under such circumstances from taking the offensive. The tactical offensive, therefore, follows naturally upon the strategical offensive. The one can hardly be without the other. The tactical attack supplements the strategical offensive, completes it, and ensures a result to it.

By strategy you sow the seeds, by tactics you reap the harvest.

Even the very feeblest opponent when driven into a corner strategically will try the fate of war on the battle-field before giving in. If the assailant should wish at such a time to hold back so as to enjoy the advantages of the defensive at the last critical moment, this would very often be tantamount to a renunciation of a decisive result, for the enemy who has been up to that time on the defensive and awaiting attack will be all the more likely to maintain this course, as it is not probable that events have improved his prospects. Cases may occur in which despair and an irresistible impulse force the defender to make a tactical attack, so that the army hitherto on the offensive is reduced to the defensive. This will, for instance, happen when the defender is forced by the assailant to take refuge in a large fortified place, and famine then compels him to attempt to break his bonds. The assailant who is investing the place is thus converted into a defender who has to prepare himself for resistance. Such was the case with the Germans when they appeared before Metz and Paris. And so it may happen that the side strategically on the defensive is compelled to change its part for the sake of securing some point of decided political importance, thereby enabling the assailant to assume the defensive tactically. When, during the winter of 1870--71, the fall of the French capital seemed imminent, and with the cessation of resistance throughout France the Germans had occasion to fight defensive battles against the enemy's armies which came up to relieve the beleaguered city, it then became evident how deeply an army which has been continually advancing is imbued with the offensive spirit, for even under such circumstances our armies almost always took the offensive in the battle-field, only confining themselves to the defensive when it was positively necessary. The strategical and tactical offensive are inseparable. The same applies to the defensive, and whichever side has been on the defensive during the preliminary operations will generally play the part of defendant also on the battle-field. The assailant presses upon him and proceeds from offensive movements to the attack itself. It is thus very difficult for the defender to find an opportunity for shaking off the yoke which has been imposed upon him, and to exchange the part of anvil for that of hammer. You then can realize the effect produced by the feeling of inferiority which one side has acquired. Even if superior it will still frequently remain on the defensive, and think itself fortunate to get on pretty well in this way. The French gave us an example of this at Vionville on the 16th August, 1870. Having been strategically on the defensive for twelve days, having been, moreover, attacked on the 6th and 14th August, they felt themselves in consequence tied to their places in the next battle also, although they had an overwhelming superiority of force. The army which is capable of a sudden change from defensive to offensive will not allow itself to be reduced at all to the defensive, but will take the offensive from the first. But, it is said, this sudden change should be made on the actual battle-field, when, according to a pre-arranged programme, a counterstroke is to follow upon the defensive which has ended in repulsing the enemy's attacks. It is true that Moreau at Hohenlinden, Bülow at Dennewitz, Napoleon at Dresden

and at Austerlitz, showed that a change from defensive to offensive is feasible upon the battle-field.[1] But these examples are quite exceptional.

At Dennewitz, besides, the object of the defender was to give time for all his forces to come up before taking the offensive, which had been from the first resolved upon; whilst at Austerlitz the defensive attitude assumed was a mere feint, attack having been the original intention. When the assumption of the defensive is forced upon an army by necessity it will generally continue in the same path. If the enemy's attack is repulsed, there will always be a doubt as to whether he will return to the charge with renewed vigour, or will accept his defeat as final. There will almost always be some hesitation, lest by making a premature counterstroke one may run the risk of throwing away the advantage which has been gained; hence the defender will generally content himself with holding his position so as not to lose what he has already secured, gladly renouncing the chance of any possible addition to his success for the certainty of being able to reckon one victory to the good.

Moreover, even when the assailant has given up any further intention of attacking, the defender can never at once become perfectly certain that such is the case; it only comes home to him little by little, often not till next morning, when he finds to his surprise that his foe has decamped. The great extension given now to a field of battle enormously increases the difficulty of remarking the transition from one phase of action to another during an engagement. How difficult it is for a defender, even if he have a superiority of numbers, to choose the right moment for his counterstroke against an energetic assailant was shown by the Silesian army at Laon. In spite of the fortunate surprise of the French right wing at Athies by York and Kleist on the night of the 9th—10th March, 1814, the general resumption of the offensive intended to annihilate Napoleon could not be effected during the 10th. From all this it is evident that a force on the defensive will rarely assume the offensive during the progress of a battle unless considerable reinforcements arrive to strengthen its front and secure its flanks or to threaten those of the enemy, as at Waterloo and at Königgrätz. Before an army strategically on the defensive assumes the offensive there will be a pause in the operations caused by the fact that the original assailant having exhausted his strength can make no further effort, in consequence of which the defender, losing the feeling of being dictated to, assumes a firmer bearing and gains positive strength, so that the exchange of part between the two opponents is being prepared by degrees long before it reveals itself to the surprise of a distant observer. Napoleon's *grande armée* in Russia was already ruined during its advance, but its destruction only became evident when its fragments commenced their retreat and the Russians began their pursuit.

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Combat.

When Clausewitz represents the flank position of the Prussian army on the Saale in October, 1806, as strategically favourable, but Napoleon's advance between the Saale and the Bohemian frontier as a very hazardous measure, we are naturally led to consider what were the Emperor's reasons for committing himself in this manner, and how he managed to emerge from such a situation as conqueror. The answer is simple. He was sure of his fighting superiority under all circumstances. The superior numbers, the experience in war, the fighting efficiency of his troops, the confidence which he felt in his own powers inspired him with a certainty of gaining the victory in the long run, whenever and however he might come into collision with the enemy. Such a feeling

[1] We may add Wellington at Salamanca and elsewhere in the Peninsula, also at Waterloo.—L. G.

makes strategical ventures comparatively easy. Even if your line of retreat is to a flank, if you have a frontier or a river in your rear, or if you have to fight with your front to your own base, and your lines of communication are unfavourably situated, all these disadvantages are not worth notice if you are only stronger than your enemy on the field of battle. The overpowering importance of actual fighting in the conduct of military operations is made clear by our whole experience and by the history of every campaign. We are not here speaking of a pitched battle but of fighting in general, of the combat, into the nature of which we will make some enquiry.

"L'arme à feu c'est tout, le reste ce n'est rien" was a saying of Napoleon's, of whom it has often been since asserted that he placed his confidence in the attacks of great masses with the bayonet. When we reflect that we can now do considerable execution with the rifle up to 1,000 metres, and with the field-piece up to twice or even three times that distance, one does not feel inclined to doubt the justice of the passage above quoted. The battles of the present day are decided by hurling great masses of projectiles upon the enemy at once. People are inclined to use rather strong expressions to denote this, when they talk of covering the ground with lead, of sweeping the field with bullets, and such like, but the true state of the case is pretty well represented by these figures of speech, for where the fighting is sharp and at close quarters nowadays no one can stand upright for any time without shelter, nor even show himself at all on horseback. Only one who is sick of life may do so with impunity, for it is well known that death will not take those who offer themselves to its embraces. Dense clouds of skirmishers lying flat on the ground opposite to one another, forming long chains of groups, exchange a continuous hail of lead till one side or the other gives way. The abortive experiments with mitrailleurs are a symbol of this mode of fighting. We aim at getting machines capable of perpetually vomiting bullets as sowing-machines scatter seed.

In spite of all this, the old superstition about the bayonet charge, to which Suwarrow gave expression when he said "the bullet is a fool, the bayonet alone is wise," has even to-day a deep meaning. The firearm causes loss to the enemy, the bayonet, that is to say the near approach to the assailant, strengthens the impression produced by their losses through the fear which it creates. The two arms must work together, for we do not so much aim at annihilating the foe as at quenching his courage. Victory is ours as soon as we have convinced the enemy that he has got the worst of it. He will never admit this to himself, no matter how terrible be the shower of bullets, if the assailant continues to keep at the same respectful distance. If the latter on the contrary approaches, this will be a proof to the defender that all his shooting will not save him from being collared. The danger appears to him imminent, and if the assailant makes a decided rush from his most advanced position he will generally feel himself overcome and will give way. This rush goes by the name of the bayonet charge, though as a rule the bayonet has but little to do with it, except in the case of street or of wood fighting, when the opponents come unexpectedly upon one another.

The still irresistible force of the charge rests upon the conviction which is impressed upon the defender, that a body of men with energy enough to press forward through the deadly rain of projectiles must also have, when he arrives, sufficient energy to put an end to him if he does not get out of the way. The fear of death thus makes him bolt. The wonders worked by the bayonet are yet a matter of belief in the Russian Army. When distinguished writers of that nation recommend the attack of bodies in close order they go too far, for these can only be recommended when confusion or darkness weakens the effect of the enemy's fire. In a thick wood or at night it will be certainly better to advance in column than to engage in fruitless

skirmishes amongst the bushes or in the dark. In all other cases extension is necessary. The forward rush of a group of skirmishers requires a higher degree of courage, because each individual of the group is more independent and not so much under the influence of a general impulse as when men are in close order. It is not the strength of a dogma but the quality of the general system of training which then renders men fit to make a determined charge with the bayonet. Doubtless extensions should never take place too soon. A body of men scattered into groups of skirmishers is out of hand and the control of the leaders upon it is much reduced. It is certainly not very manageable. A battalion in close order may be moved right or left, to the front or to the rear, by word of command, which cannot be done in the case even of a company fighting in a line of groups. The impulse to advance during fire-fight will generally be given by fresh bodies coming up in close order, because the determination to move on usually originates in the leaders, who have complete control only over the compact bodies which serve to carry out their designs. In the first part of the campaign of 1870, our acquaintance with the new far-reaching firearms being not very intimate, attempts were often made to advance in close order up to the effective range of the needle gun, after which files were opened and extended in skirmishing order. This course of action inevitably produced great loss, for whilst our infantry was advancing for hundreds of metres across the open, it was exposed to a hail of shot without being able to reply. Under such circumstances the French were quite at their ease and fired well. The Germans, however, soon learnt their lesson, and got the habit of sending forward a very widely extended detachment to draw the enemy's fire, the main body following with less risk than before. During the latter part of the war too, the infantry waited till the artillery had prepared the way for them sufficiently. During this period attacks which would have cost thousands of lives if carried out as in August at Wörth, Spicheren, or Metz, were successfully accomplished with but slight loss. Thus, for instance, the attack made by the IIIrd Army Corps on the last day of the battle of Orléans against the heights of Chilleurs-aux-Bois and the storm of the Plateau d'Auvours near Le Mans. Other methods than the simple ones just mentioned to diminish loss will be unnecessary in future wars, and all the more so because the armament of infantry of all nations has now been equalized. Those who make too much fuss about avoiding casualties lose the power of bearing those which are inevitable. How near you should approach to the enemy before opening out for attack depends upon the nature of the ground and upon the particular circumstances of the moment. As it is almost always necessary to bring up your supports in close order in order to push the skirmishers forward, the distance from the enemy's position should not be so great as to render many halts necessary whilst traversing it for the purpose of bringing up reinforcements. You must expect many of your skirmishers to fall out during the advance in wheat-fields, bush, woods, gardens, and villages, for the eye of the Officer cannot be on every man as when they are in close order, for which reason amongst others you should avoid going over great distances in extended order. There should be moderation in this. Attempts have been made of late to regain complete mastery over the skirmishers, and to convert disorder into order by thickening the chain very much, so that our lines of skirmishers are now making a fast approach to the long lines of infantry in the time of the Great King, only that they do not advance in slow time nor fire standing up, but lying down, nor do they adhere to a strict alignment, but adapt themselves to the nature of the ground, taking advantage of it and sheltering themselves where they can, a mode of procedure which, however, even in the present day is now often opposed by those who stick up for appearances and would bring us back to the days of Mollwitz if they could

have their way. One consoles oneself, however, with the reflection that such things can only occur at peace manœuvres and would at once disappear in war. Still one is apt to underrate the force of habit in such matters, which would in time cause men trained in the school of unreality to be helpless when it comes to sober earnest. We are trying thus to return to the practices of a hundred years ago and to control firing by word of command. The problem is more difficult of solution than in former days, because the extension of the troops, the confusion and the noise of the rapid fire have all increased, because the human voice is overpowered, and because the excitement of battle occupies the attention and bewilders the intellect now more than ever.

The wish to have the power of control over the expenditure of ammunition is quite natural, for if the expenditure be excessive it will be difficult to renew the supply, and a body of troops which has fired away all its cartridges is for the time of no account. You are also justified, considering the supposed accuracy of your arms, in making sure of hitting a distant mark by pouring upon it a great mass of bullets at the same time, a result which you cannot, however, expect from individual firing. It seems advisable, considering the difficulty of judging distance, not to allow all the firers to use the same sight, but to make part of the men use the sight for a distance exceeding that supposed, and the remainder one for a range short of that of the estimate, thus covering so broad a zone with your bullets that you may make sure of hitting the enemy. A mass of bullets fired simultaneously at the beginning of an action will be likely to make its effects very visible, so that after some trouble the range may be hit off with accuracy; still the result of such efforts is never quite certain, and it would be an illusion to suppose that a number of men will nowadays act in battle by word of command like a great live bullet-squirt to be directed at pleasure first one way then another. This is even at peace practice only possible in appearance, because the thinking apparatus of the common soldier works far too slowly for him to be able to direct eye and rifle on the object between the moment in which it is pointed out to him and that in which the word "fire" is given. What really happens is this: he hears the sound of the words, he fires at the powder smoke, and usually only arrives afterwards at knowing at what object he was expected to aim. If the educated man, who is accustomed to think more quickly, happens to catch something of what is said, he will all the same ask the speaker to repeat it, but will know the meaning before the latter has time to give the order a second time. Here again the slow process of communicating with the intellect through the ear is at fault. And what is difficult when there is no danger in the way becomes impossible amidst the wild excitement of battle. We must therefore content ourselves with a very small portion of the result aimed at. The influence of leaders upon men may be exerted decidedly when fire is first opened, and some of this influence is maintained throughout the course of the action. Thus must soldiers learn not only how to aim but how to reason upon the chances of success, and thus in future battles we may reckon upon fire being concentrated upon important points more than has hitherto been the case. As these will be more visible and more generally known to the assailant, whose attention has been already attracted by the direction of his movements to the intended objective, than they will be to the defender, it will be a great error to assume that all the advantage is on the side of the latter in a fire-fight. The often wonderfully good results of mass firing on the ranges by word of command show of what our firearms are capable if properly used under favourable circumstances. It would, however, be very dangerous to draw inferences therefrom as to the effect produced by riflemen in action. Without mentioning that the excitement of battle and the disturbing influence of danger are absent from target practice, and

that moreover fair weather and normal conditions are there the rule, we have further to take into consideration the important fact, that the whole attention of the rifleman is fixed upon the target which he is firing at. The numberless bewildering impressions and chequered pictures which so thoroughly occupy men's minds in battle are here non-existent. The excellent narrative of the 2nd Regiment of Foot Guards, written by Baron v. Ludinghausen v. Wolff, mentions with praise the assistant musketry instructor of No. 4 Company, Sergeant Schultz, for having, in the heat of battle at St. Privat, remarked and corrected an error committed by his men from excitement in using the fixed back-sight of the old needle-gun in firing at 400 yards. If the simple fact that a non-commissioned officer should in the midst of mortal peril possess coolness and readiness enough to rectify the sighting of the men's rifles, if this is counted as something out of the common way, as it really is, we must evidently not expect too much from the firing of the masses in battle, for to attain the same results in action as at the ranges the most elementary condition is that the right sight should be used, and if this is difficult to obtain, and when arrived at considered worthy of note, we may well give up all idea of getting men to aim properly, to hold their rifles in the right position, to pull the trigger steadily, or to attend to other points of equal importance. As it is the heavy fire which now decides the day, the commander who can bring all his rifles into action at the same time and can concentrate their fire will have the best chance of success. It is utterly impossible to arrive at this completely. As we have seen, it is necessary at first to keep back a part of your force so as to get over the different stages of the advance satisfactorily, besides which a reserve must always be kept in hand to meet unforeseen emergencies. The whole force is only brought into play little by little. At the same time, we should bear in mind that this gradual expenditure of our resources is an evil, however necessary, and by no means an advantage of the new style of fighting, and this consideration should be carefully weighed when making our preliminary arrangements for a combat. The gradual expenditure of our reserves just now alluded to as an evil is often due to a want of proper preliminary arrangement. Eagerness on the part of subordinates, want of calmness on the part of superior Officers, have led to troops being poured into action, drop by drop as it were. This has often been occasioned mainly by the fact that the fight has been brought on by an unexpected collision with the enemy becoming at once so hot that no choice was left to the commanders. Whenever there is a possibility of doing so, the troops should take up their fighting position and open out into line of battle in an orderly manner before getting within range, sufficient time being also given to move the different corps in the direction which will be the easiest and the most appropriate for their advance. A careful commencement of the combat will ensure a simultaneous and properly combined employment, if not of all your forces, at least of the greatest part of them. Methodical arrangement of this kind will save from much loss, and the time spent upon it before a combat commences will be amply regained during its progress. If more attention is paid to this matter in future than has been the case during the recent wars, our ideas as to the gradual employment of our forces will be rectified. The duration of combats will perhaps not be shortened on the whole, because a complete introduction and preparation form part of the preliminary arrangements demanding time to carry out properly, but the actually decisive stage of the whole affair will be reduced to a shorter period, and will take the form of a great united effort in the front of a formidable mass, instead of a number of little isolated blows, made in unison only in the sense that they are all intended to destroy the same object.

Even when a combat is the result of a chance meeting, the enemy may perhaps be kept at bay by a part of the force, while the remainder is being

formed up after due consideration. What has been just said about infantry fighting is also applicable to other arms. Artillery and infantry are inseparable companions; the former opens the way where the other can make no progress, preparing the attack with its fire, guarding the infantry against unnecessary loss when its best exertions would fail before obstacles too difficult to be overcome, lastly, giving it support and protection if it has to give way. As the enemy will use his guns after the same fashion, the fight will commence with an artillery duel, and it is only when the fire from the opponent's batteries begins to slacken, and that they are evidently getting the worst of it, that the infantry will begin their attack. The artillery supports this with its shot without exposing itself within effective rifle-range, but keeping down the small-arm fire from afar, and thus preventing the serious catastrophe which the infantry might otherwise be likely to undergo in assaulting the position. No rifle-ball will penetrate a garden wall. Riflemen posted behind one and firing through loopholes will pour their volleys upon the assailants with almost as much coolness as when firing on the ranges. The best infantry in the world may fail if attacking under such conditions. The braver it is, the more likely will it be to produce its own destruction, to prevent which the artillery accompanies it. Even if the shell and shrapnel from the latter cause no great material loss, they at least force the defenders to hide themselves behind cover, and to fire into empty space without aim. Whoever has once had occasion to remark the difference between an attack conducted against infantry not under artillery fire, and one which has been for some time exposed to such, will not forget it. When the first shells begin to fall into the shelter-trenches of the defenders their effect is at once manifested.

On the side of the defender, the batteries which have already been obliged to withdraw from the artillery duel come up again as soon as the infantry becomes seriously engaged, remaining with the latter in their position to the very last, regardless of the risk of falling into the enemy's hands, taking part in repelling the enemy's assault, or covering the retreat of their friends.

The part of artillery in battle is not decisive, for only a poor enemy will allow himself to be frightened out of his positions by its distant fire before being pressed by the infantry; but still artillery plays an important part, and infantry can no longer dispense with its assistance. Cavalry again wishes to have its share in deciding the fate of battle, as in the days when Seydlitz charged at Kolin, Rosbach, and Zorndorf. This hope is founded principally upon the remembrance of certain incidents connected with the great infantry fights of the late war, in which we often saw such scenes as the following: lines of skirmishers melting under fire, becoming thinner and thinner, whilst they stretched themselves out more and more, being broken up and scattered in the attempt to outflank the enemy; their strength exhausted by pressing forward through high corn or thickets, by climbing hills with breathless haste after a long march, and movements across country in dense columns. Ammunition became scarce. Many Officers had fallen, and control over the men had almost ceased to exist. At such moments the painful idea would occur to many a man who had this picture before his eyes—what if a great mass of cavalry were now to take us in flank and to sweep over the battle-field? It would with great ease destroy the remnants of our riflemen. When on the evening of the day of Vionville darkness was coming on, and hardly any infantry appeared to be left upon the widely extended field, whilst the great mass of artillery, more than 100 guns, stood in the middle of it without protection, a similar thought arose. If a large body of horsemen were to make a determined charge upon those batteries it would appear impossible to save them. This was one of the considerations which influenced our leaders in deciding to launch whatever cavalry remained available upon

the foe. Every great battle of these days presents no doubt such episodes, but the true state of the case is only apparent to us and not to the enemy, on account of the distance at which fighting is carried on. Thus the weakness is more apparent than real. In 1870, bodies of French horsemen threw themselves in the most gallant manner upon scattered German riflemen, and yet came pitifully to grief under the fire of small parties. A body of cavalry makes too good a target to remain halted within effective rifle-range, and must even avoid shrapnel fire from artillery with its showers of little bullets.

Should no sufficient cover be at hand the horsemen must seek safety in distance. Even if their Officers ride as far to the front as a mounted man can do, in order to make themselves acquainted with the state of affairs, they will not learn much, for it is only in the front line of skirmishers that you can notice any momentary weakness of the enemy, from whose bearing those in high command will first divine the approach of the crisis. If then the cavalry General were to gallop back to his squadrons as fast as possible, and bring them to the front, some time will still be required, and the favourable moment may well have passed. Moreover, the movements of large bodies of cavalry are quickly noticed. A cavalry Division at the trot makes as much dust as a whole Army Corps in quick movement, so that if the country be at all open it draws upon itself at once the whole of the enemy's fire. The latter knows moreover that it is only a question of a few minutes, during which he can well afford to stop the fire on other points. It is hardly possible to miss such a target as a cavalry Division. Artillery may be made use of at the longest ranges, and riflemen may direct their fire so that the bullets should not range higher than a mounted man at 700 or 800 metres. In rapid independent firing they will discharge a countless number of shots per minute on the advancing foe. The horse has improved in quality since the time of the Seven Years' War, and can get over long stretches at a gallop with greater ease than in those days, but this improvement has not kept pace with the still greater improvements in firearms.

Formerly, too, the fighting efficiency of infantry was at an end when its order was broken and the men were scattered. Now they begin by being scattered. Every little group forms a serviceable unit, and even the individual rifleman does not feel helpless as long as he has some cartridges in his pouch. The relations of infantry to cavalry have entirely altered. Seydlitz, Ziethen, Driesen, Geisler, could hold their squadrons in readiness at 800 paces from the enemy, riding on themselves to within half that distance to observe his movements, just as we now may look on at an infantry brigade at field exercise. They would thus note the moment when the enemy's lines were shaken, and launch their squadrons at them. All that was required was to break the line somewhere at once, which was enough to disperse the whole of it, closely connected as all parts of it were. Success is very much more difficult now, for riflemen even when ridden over are by no means on that account put out of action, their fire is merely interrupted. The cavalry hope to bewilder and to produce a lasting impression by a succession of charges, so that while their first line draws the fire of the infantry and occupies their attention, spreading a veil of dust over what is behind them, the rear lines follow unobserved, and come to close quarters with only slight loss. A hilly and wooded country, which is more favourable to their action than an open plain, affords them opportunities for unexpected attack, but even such favourable conditions will seldom counterbalance the great superiority of rifle-fire. You often hear it said that if you could only induce cavalry to expose themselves in battle with the same disregard to consequences as infantry it will not fail to gain equal success, but this is said without reflecting that there is something unreasonable in the demand. Clausewitz says, after describing the furious attacks of the French cavalry

upon the grenadiers of Prince Augustus of Würtemburg at Prenzlau, "The author is convinced, by what occurred on this occasion, that it is in the nature of the cavalry soldier not to allow himself to be shot, if he can help it on occasions of this sort."

The possession of a horse affords a man in the moment of greatest danger the means of safety, and one can hardly expect him not to avail himself of it. You may be sure that the foot soldier would often be ready enough to gallop off if he had the chance, but he can't get away from his adversary even if he feels that the latter is too strong for him. The surprising obstinacy of his resistance, which constantly astonishes us, depends in some measure upon the fact that if he does not defend himself it is all up with him. It is so in keeping with human nature that one should take advantage of one's horse to escape from death that one cannot help thinking it much less disgraceful for a horseman than for a foot soldier to take to flight under similar circumstances. Schiller could allow Wallenstein to confess quietly that "the quickness of this steed saved me from Bannier's pursuing dragoons," without fearing that his hero would thereby forfeit our respect. How different it would have been if the poet had made him say, "the quickness of my legs saved me from Bannier's pursuing dragoons." It would have ruined him morally, although really in fleeing he would probably have been giving proof of greater hardihood, bodily strength, and presence of mind. Wallenstein galloping off remains a hero to us; had he run away on foot he would pass for a ridiculous coward behind whom the curtain must at once be drawn. Masses of cavalry may possibly gain success in battle; whether, however, such success will be frequent enough for cavalry to be regarded as a factor affecting our present method of fighting can only be learnt by experience. We shall for our own part continue to hold the opinion, for which our soldiers have some justification, that German infantry has nothing to fear from foreign cavalry; it remains to be seen whether our cavalry can make itself dreaded by foreign infantry. The shock of cavalry will be most felt upon a flank, where it also will receive the smallest amount of fire, and where the stream of fugitives belonging to the enemy's defeated cavalry will to a certain extent shelter them from it; but if to make a flank attack would entail too wide a sweep to be feasible, the next best thing to do will be to make an oblique attack upon a wing. During very stubborn combats causing great dispersion, cavalry may also pass through the infantry on its own side to charge the enemy in front. It will thus surprise him by emerging suddenly from the powder smoke. A cavalry charge may do much at critical moments, even if unsuccessful, for it stops the enemy's fire for a time, and enables its own infantry to close with the foe, to do which it had hitherto found impossible. The latter must, however, take advantage of the opportunity which will quickly pass, advancing with the cavalry at once, so as to gain ground under cover of it, instead of standing still to watch the exciting scene, as is usually the case. The loss will always be heavy, and cavalry must not fear to encounter it if success in battle is desired; at the same time their loss is so serious that a body of cavalry can only be expected to make a single charge pushed well home on one and the same day. The stake is a heavy one; all the more difficult is the resolve to hazard it and the choice of the moment for doing so. Cavalry still continues to render real and important services against troops of its own arm, which it must drive away from the front of the contending armies at the beginning of an action, so as to gain the opportunity of reconnoitring the enemy's position. During the progress of an engagement its duty will be to cover the flanks of its own army. Indeed, now that it can fight on foot, and that it is accompanied by horse artillery, it may be of still greater use by passing round the enemy's wings, falling upon his line of march, checking the advance of his reinforcements, and spreading confusion

in his rear. If the artillery, as often happens, comes to the front at the very beginning of a combat boldly and rapidly, cavalry may do a great deal against it. Should some of the enemy's batteries sally forth and unlimber, as did German batteries frequently on 16th and 18th August, 1870, we may be sure that German cavalry will not fail to make immediate attack and gather the welcome spoil, regardless of their losses in doing so.

We must speak of the influence of ground upon fighting, though we shall avoid entering into particulars which would lead us beyond the limits of these sketches.

The influence of ground is now diminished, for, as often before remarked, success no longer depends upon the maintenance of a fixed order of battle. This is especially the case with regard to the principal arm. Wherever a man can penetrate, the rifleman can go with his firearm. Even high mountains cannot stop him. In a great many cases the nature of the ground, both as regards the movement of armies and actual conflict, tells equally for each side. In thick woods, in a broken, mountainous district, the defender is no more able than the assailant to make decisive use of large bodies. Often, however, the advantages of ground are all on one side, and as the army on the defensive has the choice of its battle-field, it will naturally, as a general rule, be the one to benefit.

The first point to consider in connection with battle is the condition of the roads. Next comes a matter which is always of paramount importance for our further plans, how far the ground favours the effects of our own arms and hinders that of the enemy's arms. The strength of positions no longer depends upon the obstacles presented by watercourses, valleys, declivities along the front, but solely by the manner in which the effect of firearms is more or less favoured by local conditions. Flat heights with gentle slopes appear to us to be the best positions for defence, and much to be preferred to any position taken up above steep hill sides. With a valley in front of you traversed by a stream, a meadow bottom between two ranges of hills with a width exceeding the effective range of artillery, you will be so placed that the assailant must make his infantry descend into the low ground and thus attack your side of the valley without any possible assistance from his artillery. Thus the chances will be very unequal, as the defender's artillery and infantry will work in unison against the assailant's infantry alone. Such valleys are much more favourable to the defence than those quite similar in other respects, but whose width is such that the artillery of the assailant can command the approaches to the other side from his own, in which case the nature of the ground and of the defensive position becomes of secondary importance to the relative strength of the two artilleries. If by the choice of your battle-field you can exclude one of the two principal arms on the enemy's side from participation in the action, whilst you retain the power of using both arms yourself, you will gain an advantage hardly to be balanced by superiority in numbers. Your opponent must be compelled by the force of circumstances to attack you, otherwise he will deprive your strong position of its defensive value by turning it or by taking it in flank.

High points, villages on mountains, &c., which catch the eye from afar, and which one may be easily led to regard as strong positions, as keys and as points of *appui*, are now under the very serious disadvantage that they draw the enemy's fire upon themselves as a matter of course, which reduces to a considerable extent the chance of holding them. They become targets for all the guns and rifles of the enemy, so that far from affording to the garrison the shelter expected, the losses of the latter are rapidly increased by the very prominence of the position in which they are placed. Ground with no strongly marked features, but affording some advantages, is to be preferred. This brings us to the consideration of artificial defences, the value of which,

though restricted, is not to be despised. Entrenched borders of villages, rifle-pits on heights, good barricades, and similar works, give some cover to infantry lying behind them against rifle bullets, adding therefore to the coolness and steadiness with which they fire. But such works also attract the enemy's attention and induce him to prepare the attack with a regular cannonade, which in the heat of action he might perhaps otherwise omit. Every object which catches the eye is an advantage to the assailant, as making it easier for him to direct the movements of his troops, and rendering it possible to judge the distance accurately, thus completely making up for any advantage which the defender may derive from it.

Common rifle-pits increase the losses of their occupants, if not very carefully hidden from the enemy's view by being under cover of grass, corn, or woods, so as to assume the colour of the ground around them. In the choice, in the inspection, and in the preparation for defence of a battle-field, you must therefore always consider first of all how it can be adapted to the proper use of your firearms and to shelter from those of the enemy. In the next place comes the question of proper control over your troops. If the nature of the ground renders this more difficult for you than for the enemy, you are placing yourself at once under a great disadvantage. But you must also consider the quality of your men. If they are accustomed to act for themselves, if your subordinate leaders are intelligent and enterprising, this disadvantage will lose much of its importance. Finally, it must be remembered that the division of forces occasioned by the nature of the ground may affect the bearing of the men. We have already noticed what a false position it is for troops when they are broken up, as must sometimes happen from the force of circumstances, into a number of separate fractions fighting in the same general line, and though separate so interdependent that the defeat of any one of them will imperil all the others. Any hazardous detachment of a body of troops will in like manner produce a bad moral effect. Sometimes, on the contrary, such a state of things may be advantageous, in support of which assertion we may remind our readers of the historical fact that Moltke when a young man advised the Turkish Commander-in-Chief, before the Battle of Nisib, to draw up his army with its back to the Euphrates. This is a very remarkable instance of the practical treatment of a concrete case in war, for judging from the character of the two armies thus opposed to one another, it was to be expected that the one which made some stand at first would be victorious, and one might rely with certainty that the army whose retreat was entirely cut off would make a stand. Moltke's advice, however, was not taken, and the battle was lost. Cortez burnt his ships so as to inspire his followers with the full courage of despair. The same feeling will actuate an advance guard, which after traversing a defile, or after crossing a river, finds that it has to deal with the whole force of the enemy.

In such a case even the common soldier understands that a retreat would be equivalent to disaster, and that the situation will improve hourly by the gradual arrival of reinforcements from the main body. This conviction will impart an extraordinary degree of tenacity and endurance to the defenders, whilst no impulse of equal power is acting upon the assailants. They may indeed see that it would have a very good effect to drive their adversaries back into the river which they have just so boldly crossed, but they feel that their own existence does not depend on the success of this undertaking. Thence the energy which they display will not be equal to that of their opponents. This is the reason, in addition to the weakness caused by great extensions, why the defence of river-lines so seldom succeeds. The Lower Danube, one of the most formidable barriers of this kind, has been crossed more than twenty times, in spite of defending armies, during the various Russo-Turkish wars. In the case of entrenched positions the moral element has also to be reckoned

with, often indeed more than the material. The consciousness of being led against entrenchments creates an unpleasant impression upon the men. The French had constructed a strong barricade at the north entrance to Cercottes behind a cutting made in the high road. This barricade became a mark for the artillery of the IXth German Army Corps during the battle of Orléans on the 4th December, so that there was a greater heap of dead behind this shelter than anywhere else.

On the morning of December 5th, a Magdeburg fusilier, who was engaged in examining the very clever construction of the barricade and of the trenches on each side of it, addressed the dead Frenchmen lying around as follows: "You see that all your scratching in the ground has done you no good." The common soldier comes to the right conclusion in the end, but only after gaining a good deal of experience. He is afraid when he sees works before him of encountering obstacles in face of which the greatest valour will be of no avail. The defender, on the other hand, conscious of his own weakness, is disposed to exaggerate the rumours as to the strength of his entrenchments, in which he generally receives ready assistance from the uninitiated.

Field works excite interest in the inhabitants of the country. When a newspaper correspondent gets a look at them he attributes a great value to his discovery just because it is new to him, and his fruitful imagination gives a rich colouring to reality. Those who took part in the campaign on the Loire must well remember the description of the entrenched camp at Orléans, with its batteries of heavy ship guns, its iron barriers, its wire entanglements, double and triple lines, mines, and other horrors, which appeared in the French, afterwards in the German and English papers, in such language as not to be entirely without effect. One may therefore make good use of the moral effect produced by rumours concerning strongly fortified positions in order to deter an enemy from assailing some particular point. This was the object of the works afterwards constructed by the Germans on the north side of Orléans, for there was no question of defending them in earnest, as the strength of the garrison was insufficient for the purpose after the army moved westward. Skilful use of ground or of field works may facilitate the economy of strength which becomes of double importance when fighting a battle. The parts of a position which are of natural strength may be weakly occupied, any surplus force thus rendered available being applied to other than purely defensive purposes. At the same time this economy of force should not be made general without adequate reason. There must be a clear distinction between the important and the unimportant, the former being treated with generosity, and the latter with avarice. In this manner we shall arrive at bringing a sufficient force to bear at that stage of the action when a favourable result is expected.

One often hears of the necessity and utility of strong reserves, a dogma which is closely allied to that of the gradual development of your force in action, and which is considered unassailable. Thus you often see at peace manœuvres large masses of infantry engaged in an attack, while only a small portion of them are extended and can use their firearms. All the rest follow in close order with beat of drum, and cheer as if this were enough to drive away the foe. All reserves are so much dead weight. We are not here, however, speaking of those small compact bodies which are kept back temporarily at the commencement of a combat to serve at need as feeders to the units which are carrying on the fight, but of those stronger corps which the Commander-in-Chief keeps in hand to employ later on according to the ideas which he may conceive during the progress of the engagement. These are men who march about behind the firing lines and do the enemy no harm, but at least do their friends this little good, that they raise the courage of the

actual combatants by their presence. These reserves are only of real use when brought into play. As a simultaneous use of all available forces produces the greatest effect, it may appear a mistake to form any reserves at all, but some are really required to enable a commander to meet any unexpected emergency or chance of the fight, of which some are always sure to arise. If the situation is still very doubtful, so that one may think it necessary to be prepared for any surprise, the reserves must of course be strong. The greater the certainty, the more clearly we can see into the enemy's affairs, the weaker may be the reserves. Nay, one may well conceive a situation when it would be allowable to dispense with all reserves; for instance, when we are thoroughly acquainted with the enemy's strength, and when one knows that his whole force has been brought into action. But such cases can never present themselves in reality, so that one must never fight entirely without reserves. At the same time these reserves need not invariably be strong, but only of sufficient strength for the circumstances of the moment. Strong reserves are no proof of wise but of false economy. They represent waste and division of strength, often remaining unused when they might have decided the combat. "Generals who are in the habit of keeping back fresh troops for the day after the battle are almost always beaten. You must, if he is wanted, bring your very last man into action, for there is no more resistance to overcome the day after a complete victory; the conqueror's prestige is then of itself sufficient to assure him fresh triumphs." So says the first Napoleon. It has been the custom to praise the skilful use of strong reserves by great commanders like Napoleon, but this praise was generally more justly due to them for their comprehension of how to economize their available strength in the best possible manner. Using a part only of their own force, they would manage to involve the whole of the enemy's army in a fruitless combat, then proceeding to the execution of their own original plan with the remainder of their troops, as if with a second army obtained by their wise economy. In such cases the idea of a reserve disappears, for from the very first there is a decided destination given to the troops which are temporarily kept back. In fighting an action, it is of great importance that all its different phases should succeed one another at the right time. This seems self-evident, yet it is not so, for the story of many of our later combats shows a want in this respect. The artillery was brought up after the infantry had already exhausted its strength against some obstacle. Fresh troops were only brought up to decide the day after those first engaged had already been so far expended that they could do little or nothing at the most critical moment. Cavalry was called for when the time for charging was already passed and gone, whilst it might have been sent for when the occasion for using it was approaching. This was due less to want of presence of mind than of foresight, a product of experience, practice, and coolness, which latter quality ensures the opportunity for mature consideration even in moments of the greatest excitement. It is doubtless difficult when one is in action, completely occupied with what is passing in the immediate neighbourhood, to look into the future to foresee what must occur, and to make preparations accordingly. Yet this is what a commander must do. If we have often seen in our last campaign fights arising from unexpected encounters, troops then hurried into action as they came up, disconnected efforts, unnecessary losses arising from want of unity in action, still the experience thus gained has not been thrown away. In future, we shall see the introductory stage of a combat more thoroughly conducted, the objective more carefully selected, preliminary dispositions more complete, the three arms working more in unison, and simultaneous concentration of all available strength at the decisive time and place.

The increase to the rifleman's efficiency, which seems to be promised by the

introduction of magazine arms, will hardly make any radical alteration in the nature of fighting. Such a change is only likely to occur when another propelling power takes the place of gunpowder, which, in comparison to the general standard of modern technical art, is so obsolete as only to be endured until a fitting substitute is found. This, however, is a mere question of time. Whenever a propelling force is discovered which will act upon the projectile without a loud report, and without creating smoke, yet with sufficient power, there will certainly be alterations, which cannot as yet be realized, *in our* mode of fighting. One often hears of the different objects in view when fighting battles, each of which is supposed to require a different system of treatment.

We hear of *principal* and *secondary* combats, of *false attacks*, of temporizing and *decisive* actions, in fact, we are, in the respective cases, to destroy the enemy utterly, or merely to harass him, to deceive him, or lastly to arrest his progress. Reconnoitring fights also play their part. In these you are supposed only to gain touch of your adversary, so as to find out something about him, whereas in reality knowledge should precede any collision. But it would take one too far to go through all the different forms of combat, which are given in sufficient detail by tactical manuals. Really and truly, the natural object of all fighting is to annihilate the enemy, by doing which you will attain in the most complete manner possible every object which can be attained in war, including economy of time. The commander of a rear-guard who wishes to give a retreating Division the opportunity of stealing a march upon the pursuing enemy, can attain this object in no better manner than by giving the latter a *good* beating, which in most cases, however, he has not the strength to do. He must therefore try to appear strong by bringing all his guns into action at once, by a wide extension of his infantry, so as to alarm the enemy and to cool the ardour of his pursuit, inducing him to make preparations for a serious attack, which the rear-guard will avoid by quietly slipping away. Again, an Army Corps thrown forward during a battle against the strong front of the enemy, whilst the General tries to gain his ends by turning a flank, should naturally not push home at once, as it has not sufficient strength to gain any advantage of itself. It must be held back, commencing a cannonade, and making a demonstration with extended infantry, thereby intimating to the enemy that he cannot move without being seriously attacked. Thus, the proportion which the available strength bears to the work in hand really regulates the mode of fighting. It is a mistake to give orders for a *temporizing fight* or for a *false attack*, as it depends a good deal upon the enemy whether a combat can be conducted as proposed. These fine distinctions, and various names, contain an element of danger, because a tendency to half measures may well arise under cover of the supposed expediency of certain less serious forms of combat. The simple rule is not to proceed to extremities till you have a fair prospect of victory.

Battle.

Battle must, after all, continue to be the most important phase of warfare. It produces the crisis which directly determines all the questions of the moment. It is as the sword of Alexander cutting the Gordian knot. A fresh stage of the campaign follows every battle. A single great victory has often entirely settled the military question, as, for instance, Königgrätz in 1866. We have already shown that the art of war does not consist in conquering without the gain of a decisive battle. Even the very feeblest opponent will not lay down his arms in consequence of mere strategical combinations. Although he may acknowledge the superior genius which they reveal, he will yet try to break through by sheer force the web which has been spun round

him, and thus to restore the balance. The army on the offensive is eager for battle, while that on the defensive knows that it cannot continue to avoid it and for which it consequently prepares, awaiting it and wishing it deferred to a time when circumstances have rendered the situation more than usually favourable. Battle is really the only means by which the defender can improve his position and free himself from the pressure of his adversary. The example of Daun at Kolin teaches that the fickle goddess will occasionally turn her back upon him who has been hitherto the object of her favour, and will even place a crown of laurel upon the brow of him who stands passively upon the defensive.

Battle will then always be the pivot upon which revolves the circle of events. At Solferino, 160,000 Austrians fought against 150,000 Franco-Sardinians; at Gravelotte—St. Privat, 200,000 Germans against 130,000 Frenchmen; at Königgrätz, 221,000 Prussians against 219,000 Austrians and Saxons; at Leipzig, 290,000 allies against 150,000 Frenchmen; but in the battles of the future, hosts of 300,000, even of 400,000, combatants will be opposed to one another. If the Great Powers can each place twenty and more Army Corps in the field, there appears to be no reason for doubting that the greater part of the force will be assembled on the spot where some day or other the fate of nations will be decided. Not even Gravelotte, Königgrätz, or Leipzig can give us a complete idea of the appearance which a battle-field will then assume, for not only will the increased number of the combatants exert its influence to change the aspect of affairs, but this will be affected quite as much by the working of the new firearms and by the tactical alterations thereby rendered necessary. Theory demands concentration and narrow fronts so as to obtain the depth necessary to ensure sufficient force of impact, but practice urges with incontestable force the necessity for extension so as to enable us to bring into line of battle the whole of our excellent firearms, small and great. Practice has the best of the argument, and broad fronts will be the rule.

On the 18th August, 1870, the front of the attack was not too great; nay, on our right, space rather than troops was wanting. As in the future more than twice as many men may appear on the scene, it is not at all impossible that the front may be twice as long. It will be a case not of Army Corps but of armies fighting on a line of from 3 to 4 German miles (13½ to 18 English miles).

It is true that battles as great as that supposed can hardly be produced at the very beginning of a war, for as the armies after concentration will stand in long lines opposite to one another and in close proximity, space will be at first wanted to move them all at once forward for any general object and to assemble them upon one battle-field. On a fortified frontier where the opponents come into contact simultaneously at all points, a number of preliminary combats between different sections of the two armies will naturally arise. It is only if the final crisis is hereby delayed and if the invader fails at once to penetrate, that the conflict will soon assume a much wider extension, for the endeavour will make itself manifest on both sides to release the masses from complications elsewhere and to force a concentration on the decisive point. Then, particularly if the defender has time to make a general counter-stroke, the first great pitched battle will be fought in the very first stage of the campaign. If deferred it will take place only after the first line of defence is penetrated. Whilst this operation is being prepared the defender doubtless gains time to bring up all his reinforcements, whilst the whole of the invader's forces of course crowd towards the point of penetration. This future conflict of nations is still for us a Sphynx with unsolved riddles. Technical art is striving hard to discover fresh means for enlarging the influence of those in supreme command. If it were possible to restore their

power over the course of battle to its position during the period of linear tactics the difficulties of warfare under its new conditions would vanish. The telephone and telegraph are recommended as aids in transmitting orders, the balloon for reconnaissance. The excitement, however, inseparable from battle prevents these inventions, which require coolness and quiet, from being of much use in action.[1] The only sure means of directing troops are orders conveyed by Officers. Even the knowledge obtained by the Commander-in-Chief, through reports from his subordinates, of the progress of the different fights going on in various parts of the battle-field, is but slight. As before said, it is easier for him to raise a storm than to direct it when raging. Some day, doubtless, a Heaven-inspired genius will arise who will find his element in the battle of the future over which he will exercise his sway, but as yet we have before us only an unsolved problem, which is all the more difficult of solution because we do not concern ourselves with it in any of our exercises in time of peace. Even our manœuvres on the largest scale are confined from motives of economy to the independent operations of one Army Corps, and this in comparison with what war has in store for us is but a petty affair, whilst our theoretical exercises do not go far beyond this, being intended to give rudimentary instruction for the conduct of war on a large scale. It would be desirable that small armies should be practised in actual manœuvring, and that large armies should be handled in theory, for no man is born a master of the art of war.

A substantial distinction should be made between the kind of battle which is often produced quite accidentally by the movements of contending armies (the encounter), and that other kind which ensues after those armies have long been in presence of one another, have gained all possible information about one another, and have thus been able to prepare a definite plan of action. Meckel calls this very aptly the "pre-arranged battle." It follows from the active character of present warfare, from the independence of the different sections of an army and of their leaders, that this kind of battle will be the exception, and that the casual encounter will be the rule. On the whole, the task of directing the movements of troops in the pre-arranged battle will be lightened though the actual operations will be rendered more difficult on the side of the assailant, for the enemy will be prepared and will have chosen a favourable position, strengthening it as much as possible. In the chance encounter the task of the Commander-in-Chief will be more difficult, for he will have no time to prepare himself for it, and must act on the spur of the moment. He finds a certain state of things in existence, accommodates himself to it, and has to make important decisions in a hurry without being able to obtain much information or to gain a thorough knowledge of the country and of the enemy.

For the troops, on the contrary, the work will be on the whole easier, as they will not find the enemy entrenched and prepared for defence. Advantages of ground are about the same for both parties. Let us follow the course of a chance encounter. The enemy, we will suppose, has evacuated his positions on the previous evening, commencing a movement the object of which we do not clearly make out. We attribute to him the intention of withdrawing without a fight into a defensive position close at hand in which we hope to anticipate him. We may possibly reach him before he gets there, though this hardly seems probable. Under these circumstances orders are given for a rapid advance, as haste is required. The word battle is not actually mentioned, but expression is given to the intention of catching the

[1] During the late war in the Soudan the electric telegraph was worked efficiently throughout at least one of the actions in the very thick of it, to the great credit of the operators.—L. G.

enemy, which is a sufficient intimation to subordinate Officers. Certain special arrangements for reconnaissance and mutual support cause men to look forward to next day with more than usual anxiety. The cavalry moves off in the morning somewhat earlier than usual, as soon as the sun rises above the hills. The Army Corps follow in column of route. The advance proceeds for some time without any incident. People begin to think that the enemy has taken advantage of the night to steal a march; then the first reports come in. Some scattered shots are heard. Some small outposts of the enemy in hasty retreat have been discovered. They disappear behind woods and houses. All is again quiet, but soon there is another stir. Reports come in more frequently. This time they do not concern mere outposts or reconnoitring parties or a column on the march, or even an encampment. The opportunity for dealing a heavy blow seems to present itself; there appears to be a prospect of beating an isolated portion of the enemy's army, of driving it away, or even of cutting it off. The commander of the advance guard has ridden forward to the cavalry which has formed up in a hollow and halted. The enemy should be visible from the heights in front. The commander goes thither with some of the cavalry field Officers and the chances of the moment are discussed. They are on the advance, they know that the enemy is to be assailed, they all agree that the favourable opportunity should not be lost. A galloper is sent back to order up the battery attached to the advance guard. It is already on the move, for its commander has taken his bearings of his own accord from an eminence, and has brought his guns up in front of the infantry which has made way for him on the road. A horse battery has also come up from another quarter. Both batteries unlimber and the first shots are fired in rapid succession. The enemy is evidently surprised, and the blow seems to have told upon him. The fighting, not to say the hunting, instinct is aroused in the minds of all present. Orders are sent to hasten the march. The most advanced battalion has stepped out briskly and arrives covered with dust, with its commander at the head. It comes up just in time, for bullets are beginning to fall into the batteries which up to this moment had only been guarded by cavalry. The General orders the battalion to cover the flank of the batteries and drive away the enemy, without going into any details. The commander of the battalion, although with but little information as to what has occurred, must not ask any questions, for others are doing enough in that way. He sees that the General is a little excited, or at any rate very busy. He opens out his companies and points out the direction whence come the bullets which are whistling overhead. A wood, a height, or a farm affords a mark easily indicated, and which he hastily selects for want of something better. Then come a number of loud words of command; there is usually some mistake as to the direction, which causes some trouble and shouting. Meanwhile we get nearer to the enemy, whose rifle fire now crackles away with unexpected liveliness. He has occupied the places upon which the battalion is moving in greater strength. The losses are already heavy, which renders deliberation still less possible. The best course now is to move rapidly forward, and so the companies which are melting away push on in line of skirmishers with determination and drive the enemy before them. The latter, however, reappear at various points and one of their batteries opens fire. The battalion which comes up next is ordered to cover the other flank of our artillery. It meets with the same adventures as the first battalion. The Colonel of the leading regiment, being anxious because two of his battalions have already thus been separated from one another and have plunged deep into the fight, follows with his third battalion after one of those already engaged, so as at any rate to keep two out of the three together.

Soon the whole infantry of the advance guard (whose composition we

assume to be such as has now become habitual) is hotly engaged. The enemy is stronger than had been at first supposed. Several of his batteries are in action. There is some stir on the hill where the Staff is assembled. The General commanding the Army Corps is approaching. At first sight his countenance seems to show symptoms of displeasure. But good reasons are given for the measures adopted, and he sanctions them, besides which, what has been done cannot now be undone. The first thing to do is to restore the balance, which is rather inclining against us. The General commanding the artillery is already on the ground, and sends for the batteries belonging to the main body. They also pass the infantry and hurry up. At this moment something fresh is remarked on the side of the enemy above the wood which bounds the scene of conflict—a grey barren looking spot. There is a difference of opinion as to whether it is a cloud or dust. Soon, however, all doubts are removed; it is the dust-cloud hanging over a rapidly advancing column. The only question now is whether the cloud conceals a Division or an Army Corps. The General in command thinks it wise to send the news to the nearest Army Corps on our side. Aides-de-camp gallop off with short notes in pencil or verbal messages. Now let us observe the movements of the Commander-in-Chief. He has left his headquarters in the morning at the old place, so that office work may be continued. Headquarters will only be shifted at mid-day. Reports as to the morning's march are looked forward to with some anxiety, but no battle is as yet expected. The news now spreads that distant cannon-shot have been heard. They cease for a while, and then begin again. A discussion arises as to what this may mean. There is uncertainty whether the sounds proceed from the artillery of our own army or from that of a neighbouring one. A couple of Officers off duty have ascended the heights above the little town, and assert positively on their return that rifle-shots were also to be heard, that the fight seemed to assume large dimensions, and that it is quite a serious affair. At length a report arrives, the one despatched from the advance guard of the Army Corps engaged when the idea was that the troops in view were only the enemy's outposts. The writer, therefore, only mentions weak detachments of the enemy, which had been driven off and were being pursued. The conclusion arrived at in consequence is that it is only a skirmish, and that there appears to be no need of adopting fresh measures. All settle down again, and for a time interest in what is going on is lost. In less than an hour afterwards, however, the report despatched by the Army Corps Commander, after making his own observations, arrives. He speaks of larger masses of the enemy, but wisely abstains from stating whether they are or are not superior to his own force, and concludes with the information that the Army Corps is on the point of attacking in full strength. The affair is evidently becoming more serious, and the cannonade is reported to be gaining in strength. An Officer of the General Staff, belonging to another corps, who happens to be at headquarters at that moment, is entrusted with a message to his General, in which early assistance to the troops engaged is mentioned as desirable. It is impossible to say as yet whether this will or will not be needed, but prudence enjoins that provision be made for giving it if required. An Officer of the headquarter staff rides off to the battle-field. Meantime the noise becomes louder and louder without becoming more distant. Everyone sends for his horse. The march of the headquarters to their new station is countermanded. No further news is received from the battle-field, in itself a pregnant fact. At last, after a long interval a galloper arrives, not, however, from the corps engaged, but from one not yet in action, reporting that it had departed from the line of march prescribed in order to hurry towards the battle-field in full strength, as assistance seemed to be needed, moreover that all other troops within reach had been warned.

The word *battle-field* exerts a powerful influence. The Commander-in-Chief rides off quickly towards the cannonade, coming up in course of time with troops on the march, all moving to the front with the greatest rapidity and in eager silence. Every man is bracing himself up for the coming struggle. Silence is only broken when the Commander-in-Chief and Staff appear in view, when a loud hurrah proceeds from the ranks. Soon the first wounded appear, then a batch of prisoners under a strong escort, as if it were intended to make very sure of these, the first spoils of combat. A larger body of the same follows, and the number of wounded going to the rear increases. Other columns wind down the nearest hills, all making for the battle-field. Now the high road is quitted, and the way lies through a valley leading up to the scene of action. The signs of a serious fight close at hand are unmistakable. More and more prisoners appear. Places for dressing the wounded are established on both sides of the road; field hospitals and bearers are in full activity. The wounded lie around in masses. Wagon trains, closely packed together and under escort, are halted wherever there is room for them. Officers hurry about searching for the ammunition columns, having come from the front for that purpose. The dull boom of the cannon and the crackle of the rifle now mingle in one continuous roar. The enemy's shell and shrapnel come tumbling over the hill on the right, their little white puffs showing sharply against the sky. Cheers greet the newcomers from all sides. The few barely intelligible words of a wounded Officer throw hardly any light upon the situation. After a few more minutes the little group of mounted Officers halts on the hill where an hour before the batteries which opened the battle unlimbered. The great number of dead and wounded on the ground at this place shows how severe the conflict has been. Our people have, it is clear, gained ground, but not very much. The battle-field lies spread out before the eyes of the Commander-in-Chief. Long lines of guns are in position on each side firing upon one another. Puffs of smoke proceeding from the slopes occupied by the enemy show the position of his skirmishers, rolling forward in one place, backward in another. Now and again bodies in close order may be distinguished, hiding in the folds and depressions of the ground. Heavy columns can be seen creeping from point to point in rear of the enemy's fighting line, but dust, powder smoke, and that of burning farmhouses spread quickly over the scene of conflict, and prevent the observer from making out the object of these movements. The situation of the extreme flanks of the contending forces cannot be made out, but the noise of the firing shows that they extend beyond the field of view. A General who at this moment appears acquaints the Commander-in-Chief with the state of affairs as far as they are known to him. There is no more room for doubt. What we have before us is no mere combat, but a pitched battle. In such a case the Commander who is the first to see his way clearly towards a general plan of battle will get the best of it. His task is not so easy as may appear to those who are ignorant of war. He has to make up his mind in a moment as to a great many details. In one place he sees an Army Corps advancing disconnected from all the rest. It must be stopped. In another place a body of troops is upon the point of giving up an important post. It must be reinforced. A third party asks for assistance, a fourth for ammunition; a fifth reports that its flank is threatened. The cavalry General asks whether he is to take part in the engagement, as the moment seems favourable for doing so. The artillery General wishes to change the position of his batteries, and would like to know whether this meets the views of the Commander-in-Chief. Many such and even questions of minor importance crowd upon that Officer, who runs the risk of losing sight of the general aspect of the situation amidst this host of details. In order to avoid this he requires the valuable power of being able to master details whilst at the same time making the many orders and

directions which he gives concerning them consistent with the attainment of his main object,[1] giving by this means a common direction to the numerous forces assembled on the battle-field, and making them all combine to the same end. Working thus in unison, they will gain the advantage over the enemy if there is a want of cohesion on their side, and if their General loses himself in details and gives way to vacillation. The great superiority of a leader endowed with real genius for command over the merely good and experienced General will show itself most clearly on occasions of this sort. The former may indeed err in small things; he may make some particular body of troops take a false direction, but he will come to a quick determination as to the main question, whilst the *bon Général ordinaire*, as the French call him, will very likely give the most excellent instructions to each battery, battalion, and cavalry regiment as to its own special action, but there will be a want of general unity of direction. In consequence of this, though each unit will do its own individual work well, one will go this way, another that way, without proper connection in their movements. In such cases, if the general standard of discipline and intelligence in the Army is not on such a high level that, thanks to it, unity of action is ensured without any aid from the Commander-in-Chief, waste of strength will certainly ensue owing to want of cohesion. If the campaign has been commenced in a thoroughly practical manner, and steadily, the special idea for the battle will be developed directly from the general idea by which the preliminary operations have been regulated. It is known that the idea upon which the movements of all our armies were grounded at the beginning of the war of 1870 was that of severing the French from their communications with Paris, and driving them northwards. Now a situation presented itself at Vionville on the 16th August resembling that just described. A battle was expected on the advance to the Meuse, but only on reaching that river, instead of long before doing so, and in any case on the 17th instead of on the 16th, for it was thought that the French, who had been driven into Metz on the 14th, would during the night and on the 15th have gained a great advance upon the Germans. But the IIIrd Army Corps, which was marching on the extreme right of the IInd Army, came in contact with the enemy on the 16th, the latter, owing to great waste of time, being much nearer to Metz than was supposed. The meeting produced a battle. The General in command of the IIIrd Army Corps, acting upon the principle adopted throughout the German Army, determined to take the offensive, and in doing so to throw his left forward so as to wheel up towards Metz and block the main road to Verdun. The French would thus be stopped and interrupted in their retreat westwards, that is to say, cut off from communication with Paris. But they were in greater strength than was expected, and their numerical superiority made itself felt little by little, so that our IIIrd Army Corps only held in the afternoon with difficulty the ground gained by it in the morning.

The Commander-in-Chief, Prince Frederick Charles, translating at once the strategical idea into tactical action, determined, as his subordinate had done before he came up, to bar the enemy's way, and directed the IIIrd Army Corps to maintain its actual position, whilst he instructed the Xth Army Corps which he knew to be marching towards the left to attack the enemy's right, so as to force him, if possible, completely back on Metz. On its appearing evident that the strength of his force was not nearly sufficient for the task, and that on the contrary the preponderance of the French was

[1] Solferino is a capital instance of a casual encounter between two armies, one of which was defeated, owing to the absence of supreme command and the consequent want of unity of action, while the other conquered because the decisive point was at once recognized, and all efforts were concentrated upon it.—L. G.

threatening the Germans with destruction, a second resolve followed upon the first, that of leading the enemy to think him stronger than he really was by making repeated attacks upon him, notwithstanding the small means available for the purpose.

Many an experienced soldier, seeing how the battalions had dwindled away to little handfuls of men whose strength and ammunition were also well-nigh expended, may have shaken his head when the order came to keep on constantly advancing and to give the enemy no rest. What must have been the feelings of the well-trained cavalry Officers when, as dusk was approaching, their squadrons were once more led on to the attack without having any distinct objective in view. Yet those were the only right measures to take, particularly with a view to carrying out the intention of deceiving the enemy, and of so thoroughly occupying his attention, that he neither realized his own strength, nor became convinced of the fact that his safety depended upon forcing his way to the west at any cost. Here was an instance of a great warrior on one side opposed to a *bon Général ordinaire* on the other. The former saw at once how to gain the mastery over the mind of his adversary, and thus to deprive the army under his command of their full power of action. This is the explanation of the riddle how on that day, which was the decisive turning point of the campaign against the French Emperor, 120,000 Frenchmen were unable to defeat 60,000 Germans. The old rule that each party is afraid of the other holds good in battle. He who the first overcomes this feeling and makes himself morally master of the situation will also conquer, for the most powerful influences of all upon the results of human action are those which stir the feelings, either inspiring anxiety and fear or pride and self-confidence. It is by no means necessary that the idea conceived by the Commander-in-Chief should be the very best which he could possibly hit upon. If he had the opportunity of thinking over the whole matter quietly in his study he would often evolve a better plan, but any really practical idea will do so long as he sticks to it, and takes care that even the most trifling order is calculated to further it until he can develop a better scheme. As regards the rest all you have to do is to carry out in an intelligent manner the general principles applicable to all battles, modifying your orders according to the special circumstances of each case.

It is very different in a *pre-arranged battle*. The masses have been concentrated by order from the Commander-in-Chief. Skirmishes have already taken place, and the enemy's outposts have been driven back upon a chain of rifle-pits and of villages prepared for defence where they have been rallied by stronger parties. The opposing armies are in close contact and stand face to face like duellists with swords crossed. On one side they are still working hard to strengthen their lines, on the other side they are awaiting the arrival of the most distant corps which are approaching by forced marches. At length all is ready. The patrols have been the whole day in unbroken contact, and it has cost some trouble to stop the infantry skirmishes which frequently broke out, and which might bring on battle prematurely.

At night the widely-extending glow of the camp fires shows that the enemy is still near at hand. The Commander-in-Chief transfers his head-quarters to the front, and spends the last night before the battle in one of the encampments. Everyone feels the approach of the decisive day and prepares himself for it. The two opponents are already to a certain degree acquainted with one another as far as concerns the approximate strength of the armies and the extent of their positions. The main bodies are, however, kept carefully back and concealed as much as possible. Attempts are made to discover their composition. Then follow the dispositions for the battle which is inevitable, in consequence of the close contact between the armies.

The leading idea will be adopted before the commencement of the conflict. It is founded upon the information obtained by previous reconnaissance, upon exhaustive consultations in a small circle of superior men, and upon much intellectual labour. We must of course take for granted that it is logically consistent with the general views and designs for the prosecution of the war. We must also assume that preparations have been made in a practical manner and under experienced guidance. Hence it may appear that if the strength of the contending armies has been fairly weighed, and if the troops are brave, the result must be good. But the decisive point is elsewhere. No battle can be fought exactly according to programme, for in every battle the unexpected will occur, and events will take rather a different turn to what was desired. Hence the measures first contemplated generally turn out no longer judicious. It is therefore the business of the Commander-in-Chief to choose the moment for departing from the scheme originally adopted, and for improvising measures calculated to produce the results which at this moment appear to be the most profitable in practice rather than theoretically correct.

This is a difficult task, for it is not easy to free oneself from the picture which the imagination has formed beforehand of the probable course of a battle. The combat of Saalfeld on the 10th October, 1806, furnishes an example of the evils resulting from a preconceived picture of the future. Prince Louis Ferdinand was at Rudolstadt on the 9th October, and received orders to proceed next day as soon as he was relieved by the advance guard of the Prussian main army by Neustadt to join Prince Hohenlohe, who wished to concentrate the whole of his army in position near Mittel-Pöllnitz. This intention was given up on the same day, but unfortunately the order sent to Prince Louis Ferdinand was not soon enough cancelled. There was then no direct road through the mountains from Rudolstadt to Neustadt, and it was necessary to go round by Saalfeld so as to make use of the bridge over the Saal at that place. The French were close to it. Should they obtain possession of it they would separate the two Princes from one another. Prince Louis Ferdinand therefore did quite right in advancing on Saalfeld on the morning of the 8th, and no less right in halting there, because the advance guard of the main army for which he was ordered to wait had not yet come up. This remarkable halt at Saalfeld, which has been so much blamed as a piece of imprudence, was the natural consequence of circumstances and was justifiable. But the Prince had unhappily so completely lost himself in a fantastic dream as to the further course of events that he was unable to free himself from it at the moment when action became necessary. His whole soul was bent upon a brilliant repulse of a first attack of the French in front of the defile, then upon seeing the advanced troops of the main army come up as he marched off to join Prince Hohenlohe at Mittel-Pöllnitz. If the game had been played as Prince Louis Ferdinand pictured to himself it would have been a brilliant feat of arms, but the French took very good care not to commit the imprudence of issuing from the wooded mountains about Saalfeld and of attacking. They could see from their high position that of the Prince and the weakness of his force. They made a flank march through the mountains so as to turn his right wing, cut off his retreat, and then by means of their superior force drive him back on to the Saal. The moment was come for the Prince to realize that what he had hoped for would not happen, and that he must relinquish his first plan. Two courses were open to him, either to cross to the other bank of the river through Saalfeld, or else to return to Rudolstadt whence he came. This was the only way of avoiding the danger. But his mind was by no means free, being too much taken up with his original designs, the moment for action passed, his corps was dispersed, and he himself fell, the hopes of the country

being buried with him. His fate should be a warning not to engage in a pre-arranged battle, with deeply rooted impressions as to the course which it will take.

The battle of 18th August, two days after Vionville, was again pre-arranged, and furnishes another instance of a battle turning out differently to what was expected. The right wing of the French was not posted where it was assumed to be. The intention of deferring a decisive attack in front until this wing had been turned failed in consequence of the IXth Army Corps becoming prematurely committed to decisive action. A suitable change was then made in the original plan, partly by the Commander-in-Chief, partly by his subordinates, the whole front of the position being assailed more seriously, whilst the turning movement was extended still further northwards, and thus the end originally aimed at was attained in a different manner to what was intended. It is therefore of importance that a General when directing a pre-arranged battle should carefully consider and provide for the execution of his first plan, without, however, failing to watch in an unprejudiced manner the actual course of events. In a battle of this description, quickness of decision will be less needed than in the encounter, and rarely quite at the commencement of the fight. The chance encounter and the pre-arranged battle each presents its own special difficulties to test the genius of a commander, who may well prove himself a master in one line without showing to equal advantage in the other. The last great battles were decided by turning movements combined with flank attacks in accordance with the same idea which produced Frederick the Great's oblique order of battle, and which should be the ruling idea in opening all engagements. The object is to throw the bulk of your force not on the whole but only on a part of the enemy's army. As the assailant has generally proved victorious when able to bring a superior force to bear on any one point, this is evidently what he should aim at doing.

Every kind of attack will give practical expression to this desire in one form or other. Now, however, we need not leave the portion of the enemy's army which we do not wish to attack completely unoccupied, as was the practice in the last century in similar cases. On the contrary we should keep it well in play so as to hold it fast. The mobility of the troops, the self-reliance of the different leaders, has become so great that we can no longer expect half the defensive army to remain quiet whilst the other half is being beaten. We must therefore give each half occupation. The demonstrations, the false attacks by which we formerly sought to do this, and successfully too, are based upon an obsolete idea and will now generally fail in attaining their object. Battles last too long, reconnaissances are too searching, the military instinct of the leaders has been too highly developed for such modes of deception to be effective for any length of time with such feeble means. The preparatory combats which form the first act of a battle should all be of an equally serious nature, so that the enemy may be led into error. Artillery is the arm which plays the principal part in this. A hot artillery duel commenced by the assailant may serve as introduction to the decisive attack of the infantry, while it also fulfils the object of securing and covering our own movements on other points. The view taken by the defender of these movements, upon which view it depends whether his measures are suited to the occasion or not, will often not be founded upon the impression produced by the battle picture before him but upon other circumstances. The strategical situation, the habits of the adversary, chance incidents, information previously obtained, considerations concerning the line of retreat or of communication with other portions of the army will also weigh with him. The balance of probabilities must be struck in a moment of excitement with such figures as these, and even a clever man may easily err in his calculation.

Meanwhile the assailant is completing his preparations. His masses are put in movement, being directed on the point where it is intended to push home the attack, and being concealed from the view of the defender by the nature of the ground, or escaping his observation owing to the battle which is already fiercely raging along the front, for the powder smoke which envelops the field, the uproar of battle, are in alliance with a determined assailant, helping him as they do to approach the enemy's position unobserved. In future the point aimed at will be one of the two wings, or one of the two flanks, for at these points an advantage will be the most readily gained. We must notice a remarkable change in comparison with 1870. Many of the advantages thus gained were due to the flanking action of a comparatively small fraction of the army. This cannot be the case in future. The defender will appreciate the necessity of strengthening his wings and of securing his flanks by judicious use of his reserves. We can no longer expect to come upon a weak flank after making a turning movement, and thus to roll up the enemy's line. We must rather expect to have a difficult frontal attack before us on reaching the enemy's flank. Nevertheless the defender will be at a disadvantage in one respect, being forced to accept battle on ground where he has made no preparation for it. He must also bring up some of the troops which are still available from a far distance. The assailant has anticipated him both in designs and in measures. On the other hand, the latter is forced to threaten the wing and flank of his foe with the bulk of his forces instead of with a portion thereof. Whereas in former days three, four, or five Army Corps have held the enemy in front, whilst one or even half a corps has made the turning movement, in future the smaller proportion of the force will be employed in the former way, and the larger proportion for the latter purpose. The players will exchange parts. This is easier said than done. First of all, the small number of Army Corps which advances upon the front of the defender will generally get into an awkward position, having to deal with a considerable superiority of force, whilst the impending counter-attack threatens to fall upon the troops engaged in the turning movement, and although this is a difficult undertaking, the commander of the assailing force must apprehend it, and thus his firmness of resolve will be put to the test. Again, it is difficult to move the great masses which execute the turning movement in a space confined to distinct limits without getting them into confusion. Everything must be done with the regularity of clockwork, and there will be better opportunities than in the last wars of showing ability and experience in combining the movements of large bodies in close order. In this respect there has been hitherto a certain monotony of treatment. We have always made a rule of accepting as the only possible formation for the advance of an Army Corps, that which is the most convenient, namely, the usual narrow column of route with its depth of 3 miles (13½ English miles). When Prince Frederick Charles ordered his army to depart from the usual custom on the morning of the 18th August, 1870, many a voice was raised to pronounce this to be impracticable. The measure was also blamed by many after the campaign. It was the first instance of an innovation which the practice of the future will sanction. The Army consisting of six Army Corps, and two cavalry Divisions, was drawn up in the morning, fronting the road leading from Metz, by Mars-la-Tour, to Verdun, with its right in rear of Rézonville, and its left in rear of Hanneville-au-Passage, the extent of the whole front being 1½ miles (6¾ English miles). The intention was to advance northwards and afterwards to change front to the right or left, according to circumstances, as it was still uncertain on which side the enemy would be found. The advance might be a matter of 1 or 2 miles (4½ or 9 English miles). It really proved to be as much as 3 miles (13½ English miles) for the left wing. The Commander-in-Chief foresaw that, if the Army Corps which were con-

centrated each in its bivouac were first of all to be formed into columns of route in case he should wish to deploy them for battle the whole day would be occupied in doing so, and that a considerable part of the troops would be unable to come into action. He therefore issued the following order: "The advance will not take place in columns of route, but by Divisions in mass with the corps artillery between the Divisions." Although this order was not universally carried out, and although an occasional block and some friction occurred owing to misunderstandings, it is still due to this order that the whole of the IInd German Army was able to take part in the battle of this day, although the scene of action was 3 miles (13½ English miles) distant from a portion of it. The critics of the day found fault with the innovation, because it set at nought the superstition as to the necessity for narrow columns of route for movement in large masses. However judicious the practice may be in general, we should still not be afraid of departing from it at need. Exceptions from this general rule will be frequent in the battles of the future. Frederick assembled on the morning of May 6th, 1757, after a night march, 65,000 men on the heights of Prosik, near Prague, and opposite to the Austrian position. He then took ground to the left with his whole force still in close order for a distance of 1½ miles (6¾ English miles) over a country not less difficult than that traversed by Prince Frederick Charles' Army on 18th August, 1870, and deployed at about noon for the general attack on the enemy's right wing which he had turned. Napoleon the 1st has often advanced on the enemy with a force more than equal to an Army Corps in strength in a single column of route, bringing all his troops into action by midday after making a good march. The advance of 20, 25, or 28 battalions for long distances in close order, ending in combined action on the same point, was a feature peculiar to the old Prussian tactics of the review ground. All this will again be necessary. It may be that we shall only gain our end by giving greater width to our columns and thus diminishing their depth by moving cavalry and artillery on the roads with the infantry by the side of them, and by bringing our masses to the front deployed for action as was intended on the 18th August, 1870.

Thus only shall we arrive at concentrating large masses of men at a critical point and at the desired moment. The occasion is extraordinary, and our measures must therefore be out of the common way. You can march even with a front of half-zugs on the broader roads (one-sixth of a company; say fifteen files). The depth of a Division will then be ½ a mile (2¼ English miles), and of an Army Corps 1½ miles (6¾ English miles).

Night may throw a welcome veil over the proceedings of an assailant, concealing his preparations from the prying curiosity of his opponents, and favouring his approach to positions to get near which by daylight would cost many a life. But no opportunity should be lost of shortening the space which troops have to traverse under fire in making an attack, not so much to avoid the actual loss as to save the men as much as possible from what will weaken their strength and energy before the decisive assault is made. On the morning of the 1st September, 1870, on the second day of the battle of Noisseville, it was reported that the French had on the previous night attempted to storm the villages whose possession had been contested on the 31st August. Prince Frederick Charles then expressed his opinion at once that it would in future often be desirable to storm well situated and strongly occupied villages by night (as the fire of our present arms renders such posts almost impregnable by daylight), and after storming them to hold them throughout the day. By making use of the night, we at all events increase the time, of which so little is generally available for our battle preparations. It stands to reason that all such measures calculated to facilitate the employment of troops are only to be adopted when urgently required, for they are

trying to the men, and use up part of their strength, the whole of which will be fully needed. Battles which last several days are hardly ever free from night work. Decisive action against a wing or a flank must be well combined with an advance on the enemy's front. With the vast dimensions of armies, and the great subdivision of command, success will only be possible if arrangements are complete and carefully made. The decisive blow should not follow immediately upon the introductory combats, as it is advisable to give the defender time to make mistakes; it should not, however, be too long deferred, lest the absence of any serious error in the introductory combats be detected, and these combats be thus deprived of their utility. A quarter of an hour, more or less, may be of great importance, and may determine the issue. As soon as the moment for dealing the decisive blow seems to have arrived, we must lose no time in delivering it, lest the enemy should take advantage of it to make a change of front. Care should also be taken that when the decisive attack upon a wing commences, the frontal engagement be not allowed to die out. On the contrary, fresh vigour should then be imparted to it. The Commander-in-Chief must divest himself of all anxiety as to the loss of his communications, a risk which is greater when making a flank attack on the actual battle-field than when making a turning movement before the battle, for any such apprehension will weaken his resolution and his action. His whole attention must be directed to the front.

The line of communication is best defended by attacking the army before us with all our force. Battle is so infinitely more important than any other part of military action, that any doubts which tend to cripple the energy of the commander should be set at rest. A good General will never inquire, when forming up his masses for the decisive blow, how they will be situated with regard to their natural line of retreat, but only by what line they can be brought with the greatest speed and effect to the front. No one in the German Army on the 18th August, 1870, was at the moment conscious of the fact that they were fighting a great battle with their front to the proper rear, and that while making their movement to turn the right flank of the French thay had entirely relinquished their own original line of communication. The attention of all men was concentrated on the attack, was directed to the front and to victory, not to the rear and to retreat. Thus increase of power was given to the attack, and so it should always be.

In describing battle, we have, without premeditation, represented an offensive action. What German soldier would do otherwise? Still, the love of method demands that we should say something of a defensive fight. The assailant avoids the front, which is the defender's strong point, of which he may well be assured. If the position is occupied in such a manner that the whole of the ground before it is swept by a powerful fire, here on the battle-day at least reserves may be entirely dispensed with. They must be held in readiness near a wing or a flank, where the assailant will be sure to seek a more favourable battle-field. The flanks are the defender's weak points, and as a general rule the situation will indicate which flank will be principally or the only one threatened. To this flank all available reserves will be despatched. The General must struggle with all his might against being led into confounding defence with passive resistance, for the very idea of the defensive weighs like a lump of lead upon the mind of a commander, and cramps his energy.

An attempt has been made in almost all the battles of these later days to secure an exposed wing from being turned by prolonging the position on the approach of the decisive moment, but as the assailant thereupon extended his own force still more, it came to pass after all that the defender was outflanked all the same, becoming weaker and weaker in the process, and being finally rolled up. The safer plan seems to be to strengthen the wing by

means of movable bodies not tied to any particular spot, but entrusted with the special duty of falling upon the assailant at the right moment, so as to prevent him from making his turning movement. During the battle on the Lisaine, an independent detachment was thrown forward by the Germans to a distance of 4 kilometres (2½ English miles) in advance of the right wing of their defensive position, and was directed early on the morning of the 16th January, 1871, to fall upon the flank of the French as these advanced to the attack. The execution of this plan was, however, prevented, as the French directed their assaulting columns elsewhere. Still the mere idea of this kind of defensive action is worthy of note.

It finds its counterpart in the plan of a battle which, though expected, never came off. At the beginning of the war of 1870, the IInd Army selected a battle-field near Marnheim, on which to receive the French, if the latter assumed the offensive too soon. Four Army Corps were to hold the front, whilst one manœuvred on each wing to protect the flanks, a seventh corps forming the general reserve. The more mobile the defender is, the less he feels himself bound to his original plan, the stronger will he be. Movement and activity give strength in war. The defender may well defeat the attempts of the enemy to get round his flanks, by making offensive movements from his front line on the day of battle, just as he may have done during the preliminary manœuvres, but to act thus great determination is required, as well as considerable sharpness and a quick eye for seizing the right opportunity, for a counterstroke of this kind generally leads the performers into a circle of fire. Still, though the task must be admitted to be difficult, it is by no means impossible. Let us suppose the French Guard on the 18th August, 1870, to have been posted in reserve behind the right wing, instead of being as it was in rear of the left, and let us suppose further a Buonaparte to have been on the heights of St. Privat, it is very possible that when the attack of the Prussian Guards was brought to a standstill, the turning movement of the Saxons not having yet produced its effect, a counterstroke of the defenders on St. Marie-aux-Chênes against the much reduced and exhausted battalions of the assailant would have led to a great success. It is, however, a mistake to make use of considerations of this sort as an argument against turning movements in general, as we find frequently done. People often blame the turning mania, without reflecting that it is quite natural that we should nowadays endeavour to gain the flank of an enemy in battle. This desire is in keeping with the moral constitution of our army.

A body of troops comes into collision with the enemy, deploys, fails in forcing its way through, and is reduced to a standing fight. The next corps arrives, and sees that it cannot get on this way, or at any rate can only do so with difficulty. Its leader has been trained to habits of self-reliance, to the practice of the initiative and of action after the dictates of his own intellect. He, therefore, looks out for a line of his own by which he may get on more quickly and more easily. Thus he is led little by little to feel for his enemy's flank, and to extend further and further with a view to turning it. But the examples of Noisseville, Beaune la Rolande, Beaugency, the Lisaine, &c., also show us clearly how little hope of success there is in a purely frontal attack, and we come to the same conclusion when we examine the state of affairs which preceded the moment when turning movements became efficacious in the great battles which were decided by such operations. Spicheren, Wörth, St. Privat, &c., show us that the frontal attack is a very costly and unprofitable proceeding, and one which produces no decisive result. It is the fire-arm which gives victory, and nothing adds to its effect so much as a turning movement, thanks to which the enemy, confined as he is to a narrow space, is outflanked, and placed between two murderous fires. A battle like Sedan, where the defensive army is completely surrounded, brings out the destruc-

tive effect of firearms to the fullest extent. Colonel Blume concludes his remarks upon attack and defence with the following judicious words: "The best security for the superiority of the assailant over the defender is obtained by simultaneous and enveloping attacks, carried out with all his strength against both front and flank of the foe." A weak attack on the flank will certainly fail in future wars, while even a strong one may be defeated by an able use of independent bodies, pushed forward beyond the wings of the defender, or of reserves posted behind those wings; and an attack of this sort made, without proper precautions, may be severely punished by an effective counterstroke, but this is no reason for utterly rejecting the principle of the turning movement and the attempt to make it. If we were to break up our armies into fractions systematically when in front of the enemy, as some industrious writers recommend, we should be sowing the seed of defeat instead of victory. The zeal displayed against the *turning mania* is founded not only upon the dread of frittering away our forces and of mixing up our units, but also upon a dim consciousness that tactical reforms must be general after a great war. To this feeling is also due the common, though unreasonable, tendency of the conqueror after his brilliant victories to cultivate in peace-time the faults of the vanquished and to neglect the advantages which he himself possesses. The contrary system to that which has approved itself is adopted, merely because it is the contrary system. After developing a great accession of strength by giving free play to individual initiative, we try to put restrictions upon self-reliance; after attaining to well-timed unity of action, owing only to the unrestricted practical measures of those in command, we preach a strict adherence to method and system; after conquering by a lavish expenditure of strength, we dwell upon the necessity of avoiding loss. After learning by actual war experience that cavalry is of little use in deciding the fate of battle, we place our hopes for the future in great cavalry charges; after seeing a worn-out and exhausted foe resort to entrenchments, we on our side recommend a diligent use of the spade. Everything, however good, has its bad side. He who reforms for the mere sake of reform throws out the grain with the husk. Or they fancy that they see in every failure a fountain of new strength which only requires tapping to become a source of future success. In the eagerness of the discoverer they lose their impartiality and contract prejudices. These men are the founders of those over-refined and distorted theories of war which are the precursors of defeat. Great wars will generally produce innovations in warfare, but these should not be sought for by design. They will force themselves on our notice quite simply by reason of their manifest utility. The flank attack should in truth be considered the most powerful but not the only method of ensuring victory. There will be occasions on which a turning movement is rendered impracticable by natural or artificial obstacles; for instance, an entrenched position between two barrier forts. Such a position cannot be turned, but it must be carried. A frontal attack may, under certain circumstances, be inevitable, which, however, does not mean that the whole front must be assailed with equal energy; otherwise the predominant principle of all generalship, that of bringing the mass of your forces to bear upon the decisive point, would be set aside. The commander who tries to be equally strong everywhere is everywhere equally weak. It will be well, therefore, to direct your real attack upon one wing, merely threatening the remainder of the enemy's front; that is to say, only to oppose him there with comparatively small forces, as you may give up all idea of gaining any decisive advantage by a frontal attack. It ought seldom to be possible to assemble before the battle, without notice by the enemy, the masses intended to deal the real blow opposite to the wing selected for attack. This must generally be done while the battle is actually proceeding. The

concentration for the decisive assault should not take place until numerous batteries are in action along the whole front. The enemy's attention will be all the more occupied the nearer the corps threatening his front approach to it. He will in this way be more easily impressed with the idea that the fighting which is only kept up to divert his attention from the critical point is part of the real attack. But this near approach at the same time increases the risk for the troops which are carrying out the feint. The enemy can get at them, and by making a counter-attack he may altogether quench the ardour of the frontal attack, an ardour which is only feigned. The measure which has been recommended to the assailant under such circumstances, namely, that the troops opposed to the enemy's front should take to the spade and entrench themselves, thereby opposing a strong barrier against the enemy's attempts, has this disadvantage, that it will soon reveal the fact that no decided attack can be intended where such preparations are being made, but the measure should not on that account be despised. On the contrary, advanced lines of works may be necessary until you are near enough to the foe to make your final rush without having too much open ground to traverse. Mobility will be of the same service to the defender when the attack is directed on one of his wings as when his flank is being turned. He may often, if he takes in the situation quickly, make an effective reply to the enemy by sallying forth from the entrenched wing, and rolling up the troops which are threatening his front, which would bring the masses engaged in their movement of concentration to a full stop, and would throw them into confusion. Perhaps he may also be able to treat the serious attack upon the threatened wing in a similar manner. If so, his victory will be complete. But to do all this, a strong force and great decision are required, as in the case of the counter-attack upon troops engaged in a turning movement. The attack upon a wing will, if successful, become, as the fight proceeds, an outflanking one, for the attempt on the part of the assailant to roll up his opponent's line is just as natural as that of the defender's defeated wing to close upon the centre for protection; and in this manner the assailant obtains the room necessary for his turning movement, room which was at first wanting. Attacks upon a wing will, therefore, be more frequent in future than those upon the centre. The latter, which in case of success will result in breaking though the enemy's line, and thus in dispersing his forces, can hardly be expected to cope with the natural strength of frontal defence upon the battlefield. Those engaged in it must, as it proceeds, get more and more between two fires, which is of more importance now than in Napoleon's time, on account of the greater range of the firearm in the present day. At all events, the breadth of front of the assailant must be sufficient, and while penetrating the centre, care must be taken to provide plenty of occupation for the enemy's wings. The figure of a wedge driven into a position does not now apply to this sort of attack, in so far that the "thin end of the wedge" would soon be transpierced from all sites by the defender's storm of shot, and shattered to pieces. To break through a defensive line in this manner demands numerous and good troops, together with an iron will on the part of the commander, who must be one who will not shrink from bloodshed. Such a feat can never more be performed at a single blow, but must partake more of the nature of a boring operation interrupted by intervals of rest, and then carried on anew by fresh troops, every step gained being secured by earthworks during these pauses, so that it is a case of position approaching to position. Frontal battles on a large scale will all be of the same character, and will last several days. It is easy to foresee how great will be the loss of those engaged. Several episodes like those between the 14th and 18th August, 1870, may in future follow one upon another. But the more serious the affair the more decisive will be the success of the side which survives it. In spite of the

sacrifices demanded we must continue in the future as we have done in the past, to aim at fighting great decisive battles, and no greater proof of wisdom is shown in the conduct of armies than by concentrating all energy, physical and moral, on gaining the victory in such battles. A triumph on the field of battle extends itself to the whole theatre of war, all doubt is removed, and the victor becomes undoubted master of the situation.

Pursuit, Improvement of the Victory, Retreat.

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We not only know by experience that immediate pursuit after victory has hardly ever taken place in the latest wars, but it is also consistent with the character of modern battles that such should be the general rule. The great dimensions of the battle-fields, the disruption of the general conflict into a number of separate battles and combats, the wide interval which separates friend from foe owing to the range of our firearms, all these things render a clear view of what has occurred so difficult to obtain, that on the evening of the decisive day the Commander-in-Chief will hardly ever be able to make out what has been the general result. The fear will always arise in his mind lest he should meet with a check by commencing his pursuit prematurely, and lest by endeavouring to improve his victory he should allow what has already been gained to slip out of his hands. He may think himself lucky if he can leave the field of battle with a positive certainty of having gained the victory. The situation only becomes thoroughly clear when the defeated army has completed its retreat. Hence under ordinary circumstances the morrow of the fight will dawn before the state of affairs is sufficiently clear for new orders to proceed from headquarters, by which time it is too late for a close pursuit, and it is only from headquarters that directions for undertaking an immediate pursuit from the battle-field can proceed. Every battle produces intense excitement, the greatest tension of bodily and mental strength; a period of reaction must naturally follow. The feeling, too, very naturally arises after victory that further exertions are useless, or that they will not be fully repaid by the success resulting from them. Each therefore of the corps which stand side by side in line of battle will generally wait for one of the others to commence the pursuit even though the necessity thereof is apparent. Each man is inclined to think, as we have before remarked, that the largest share of the general work has fallen upon himself, and that the hardest fighting has been his lot. Everyone thinks that he has been exposed to greater danger than his neighbours. The nature of the flank attack, moreover, is such that in case of success the different corps pressing forward, as they do concentrically, get more and more intermingled, forming a sort of kaleidoscopic mixture. The greater the valour and success of the assailants, the further they penetrate, the more will they be intermingled. At the end of a battle you will rarely find a formed body in first line awaiting orders, and it will be quite the exception to meet there at the right moment fresh troops which have not been engaged. Those further in rear see too little of what is going on to commence a pursuit. Such are the reasons for the absence of close pursuits after battle during the late wars. The most recent examples of such pursuits date from the Napoleonic period.

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The victories of that commander were completed by the most energetic pursuits, his masterpiece in this line being in 1806, for his advance on Lübeck and on the other side to the Vistula was a regular chase of flying shreds of armies. No one learnt so much from him in this respect as his inveterate enemy, Blücher, whom he piteously hunted to Lübeck, and who had afterwards the opportunity of repaying him in full, for his pursuit of the

French after the battle of the Katzbach is worthy of being compared with Napoleon's best achievements, and by a strange freak of fortune the Emperor's last battle was converted into a crushing disaster because Blücher knew how to follow up a victory with an immediate and unrelenting pursuit But we must remember that at that period war had been freed from its former trammels, whilst the armament of the troops remained unaltered Battles were still fought at close quarters.

Nowadays when victorious infantry storms a position after losing many men it seldom finds any of the enemy on the ground except dead and wounded. The direction of the enemy's retreat is first made known by distant rifle-shots from a range of hills, from the border of a wood, or from a village, and by the fire of the guns which are covering the movement. The opponents come indeed to close quarters in villages, but the scenes witnessed there only affect a small part of the army. Even nowadays you can only use the strength of man and horse in pursuit, whilst the effect of the enemy's artillery in hindrance of it extends three times as far as in former days. As long as the assailant is able to reach the retreating army with his fire from the original position of the latter, it is better not to move, but to take full advantage of it. This circumstance, the greater dispersion of infantry and the intermixture consequent upon flank attack, explain the fact that after Königgrätz a part of the beaten army was able to get away over the bridge of Pardubitz after a flank march of 3 miles (13½ English miles), and that there was no close pursuit also after the great battles in 1870–71.

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You cannot think of pursuit unless there is no mistake about the victory, and even in that case special arrangements are necessary. Written orders for the purpose as used in the late wars are of no effect. The Commander-in-Chief proceeds after issuing them to his headquarters, and the gallopers ride out into the darkness. They have to make a long search before finding the General to whom the orders are to be delivered, which is always difficult in the confusion prevalent after a battle. The General does his best to perform his duty by forwarding fresh orders to the most advanced troops of his Division. Another galloper has to ride off in the dark, and by break of day arrives with his despatch at the advance guard, which has just succeeded in getting some wood and provisions, and is preparing to cook breakfast. It must now commence the pursuit without delay, so says the order, but its already comparatively old date weakens its impression and, as a general rule, its only immediate effect is that the outpost squadrons are roused earlier than had been intended, and are pushed forward on the enemy's traces. They ride on to the next defensive position, where they are stopped by the enemy's stragglers, by a broken bridge, or by some other obstacle. Presently the main body of the advance guard comes up and puts an end to the enemy's opposition. Under favourable circumstances an ordinary day's march is accomplished before they come to a halt. Some of the enemy's stragglers have been cut off, and some spoil has been captured, but nothing of any consequence has been done. Now this picture is by no means imaginary, but one often presented to us in war.

A passion for war can alone give the impulse required to conduct a pursuit. Personal influence is necessary, and indeed that of the Commander-in-Chief himself, immediately after the battle. He must himself put into motion the squadrons and battalions which are fresh and ready, he must accompany them in person throughout the night, and direct their movements if he wishes the pursuit to be in earnest. We have already noticed the motives which inspire beaten troops, giving them marching powers which were hardly to be expected of them. The same motives do not influence the victor; the propelling force must therefore in this case come from above or the fugitives

will never be caught. The means of pursuit will only be available if there has been a due economy of strength and if the victory has not been too hardly earned. These means must be collected towards the end of the battle, but the Commander-in-Chief, fully occupied as he is with the pressing needs of the actual moment, is not unlikely to overlook these preparations. It has been proposed of late to entrust them during the battle to one of the principal Staff Officers in the same manner as suggested for the regulation of the Intelligence Department. The idea seems good, but as this Officer can hardly be allowed to dispose of bodies of troops, his advice will only become useful after it has received the approval of the General-in-Chief, who must thus be the lever of action in all which concerns pursuit of the enemy. It is especially necessary to bring the cavalry into action. Its leaders are the best assistants of a Commander-in-Chief in pursuit, and on them it may most esp ecially be enjoined to act upon their own responsibility in the absence of ord rs from above.

If there are serious obstacles in the way of success on the battle-field, these obstacles disappear after the battle, when the strength and order of the infantry are broken and their ammunition is exhausted. Being bound to join in the general retreat, they soon have to give up any temporary position affording good cover which they may have found. Great cavalry charges upon the retiring hosts may at this period produce important consequences, but the artillery which covers the enemy's retreat must at the same time be kept under, and therefore numerous batteries must join in the pursuit. The horse batteries of the cavalry Divisions kept in rear of the fighting line will generally have been already engaged. They should therefore be relieved and should complete their ammunition, or else some other batteries should be substituted for them. All these measures must be thought out beforehand, or otherwise their execution will be delayed. The infantry is already in contact with the enemy, but widely extended and difficult to direct on any point. Should some bodies in close order be at hand, they will rarely form part of the same organization, and are so far wanting in the strength of cohesion. In the particular instance before us, however, quickness is of more importance than great strength, and there should be no hesitation about laying hands upon all the nearest troops available, without minding whether they form part of the same unit or not. If the enemy is being pursued along a single road, he can always bar it as long as he still has some troops in fighting condition. It is therefore advisable for the pursuing force to assume at once as broad a front as possible. To improve a victory and to gather the spoils thereof are things which go hand in hand. Although the late wars are poor in instances of close and vigorous pursuits from the battle-field, there have been instances of making a good use of victory in other ways; for instance, by entering upon new and great undertakings as a consequence of the fight just ended, whose result was at once entered upon the credit side in the strategical book, a fresh departure being then taken. The consequences of this course were not so immediate as those of a direct pursuit, but they reached further, and they will always be of the greatest importance. The spoils which await the conqueror close in rear of the battle-field may escape him, but he assures to himself the richer booty which accrues to him from the alterations in relative strategic strength consequent upon the battle. The said booty consists in the advantages which the victor may now gain from greater freedom of movement, increased self-reliance, consciousness of superiority, and sureness of decision. The next morning may be allowed to pass away quietly if only the evening brings with it a renewal of operations directed on fresh objectives. The finest example of this manner of improving a victory may be gathered from the events of August 19, 1870, the day after the decisive battle of Gravelotte—St. Privat. The

first hours of that day passed without arriving at a clear comprehension of what had occurred. Pursuit would by this time have been impossible, even if the neighbourhood of the fortress had not prevented it. By midday, however, fresh orders were issued which concerned themselves no longer with the immediate consequences of the battle, but with the more distant future. A part of the army was told off to enclose the defeated enemy in Metz, whilst the remainder was at once placed in movement towards the west, being at the same time formed into a new army under separate command and provided with all the necessary departments for subsistence and discipline. Not a day was lost in furthering the main objects of the war. This was undeniably the best way of reaping the fruits of victory. The victor can immediately after the battle turn his thoughts to his own great interests. He is thus most thoroughly independent of his opponent's will, and may pursue his own designs without interference. As soon as the favourable nature of the situation is understood, not a moment should be lost in taking advantage of it—the instant after the battle, when it is so easy to forget, amidst the joy of victory, that the future should always occupy our attention more than the past in warfare—this is the very time when those in supreme command should display the most extreme activity. Many a General has lost the fruits of a victory by wasting the following day in firing a *feu-de-joie* and holding a service of thanksgiving in its honour. The situation of the defeated party is very different. He finds himself compelled to give up all thoughts of his own chief objects for the time, and to think only of his immediate safety. This is for the moment his chief element of weakness. Retreat means for him relinquishment of what had been hitherto the object of his operations, and all he now seeks is safety. The defeated army quits the field under cover of its artillery. If it has a numerous and good cavalry to hurl against the enemy, the difficulties of its first movements in retreat will, as was the case at Gross-Görschen, be much diminished. The great thing is to gain a start upon the victor, so that he may not be able to follow you up too closely. It is a well-established fact that nothing will so well help you in gaining this start as a strong rear-guard with many batteries. But the enemy has the superiority, and it is rare that anything can be wrung from him by force. You must, therefore, have recourse to stratagem whenever the opportunity presents itself. The eccentric retreat, which is so often blamed as a fundamental error, will be the most likely to furnish such opportunities. If the enemy cannot clearly make out in which direction he should pursue with the greatest vigour, his pursuit will all the sooner become less pressing. He will be led astray; the reports received will be more difficult to interpret, coming as they will from various points at the same time, than when the pursuer has the retiring foe before him on a single road. As is well known, the great army of the Loire made an eccentric retreat after the second battle of Orléans in December, 1870. When the conquerors had penetrated to the very centre of this army and Orléans was taken, they found the enemy in front of them southwards towards Vierzon, and prisoners of the XVth, XVIth, and XVIIIth *Corps d'Armée* were brought in. But the French also showed themselves down the river at Beaugency, to which it was ascertained that the XVth, XVIth, and XVIIth *Corps d'Armée* had retired; also that they had received strong reinforcements. Higher up the Loire again, at Gien, the Germans also came upon the enemy in considerable force, finding troops belonging to the XVth, XVIth, XVIIIth, and XXth *Corps d'Armée*. It was evident from this that all the enemy's corps were intermingled, and it was not easy to determine in which direction the pursuit should be pressed. Notwithstanding their victory, the position of the Germans was not without its difficulties. Their original intention to advance on Bourges and Nevers was relinquished as soon as the resistance offered by General Chanzy at Beaugency proved stronger than was expected. Thanks to this, however,

General Bourbaki escaped from pursuit, and was soon after able to place his army, which had meanwhile been reinforced, in movement towards eastern France.

An eccentric retreat enables the retiring troops to make use of a greater number of roads and to get away with greater ease. At the same time it exposes them to one disadvantage. The result of the battle has just shown that the united force of the now retreating army could not meet the enemy on equal terms so that in its present divided state it is still less likely to make a successful stand. Very often, however, there is no intention of fighting during a retreat but the desire is to avoid all combat. A united force is therefore not necessary, and the retiring army is justified in profiting by all the advantages arising from the separation of its parts. Subsequent concentration when the enemy ceases from pursuit should always of course be kept in view. Thus, General D'Aurelles de Paladine, who had given directions for the eccentric retreat from Orléans, modified his plan afterwards into concentrating his whole army on the Sauldre. He would, however, have been unable to accomplish this, though he might possibly have effected his concentration behind the Cher or the Indre, but his removal from command prevented him from doing so. Frederick also made several eccentric retreats, one of which in 1757 did not turn out well. It is only when we hope to give battle during the retreat that we should keep all our forces together, and even when using only one line of retreat it may be possible to deceive the pursuer. By taking up a position on one side of the road we may attract him to that point and induce him to deploy in a wrong direction and thus gain time which is the main requirement on such occasions. The long range of firearms favours attempts of this nature. A hail of shot pouring in from the far distance may make the enemy stop and induce him to deploy whilst those who caused the alarm have time to get away. Flanking positions of all kinds will be taken advantage of by the retreating force if conducted in an able and spirited manner. The original direction of the retreat is, as a rule, forced upon the beaten party. It has to choose the roads by which it can the most easily escape from the enemy. The first thing the General has to do is to rally his men and to re-establish order. When he has regained his power over the retiring masses he will divert them from the line of retreat forced upon him by the enemy to that which seems the natural one as leading him towards his nearest reinforcements, or to the nearest shelter afforded by a defensible line or by a fortress. He must come to a halt as soon as he can, for nothing damages defeated armies so much as long retreats. A short one seldom entails severe loss, but the length of time, fatigue, and demoralization which are inevitable accompaniments of a long-continued retreat, are sure to throw into the enemy's hands guns, prisoners, baggage, and supplies of all kinds. Again, it is of vital importance to the defeated army that the question of its own safety be as soon as possible dismissed from the thoughts of its commander and the general objects of the campaign be again taken up. The quickest way of arriving at this will be by means of a successful engagement, even if it be only of secondary importance, to act as a turning point. A successful feat of arms will alone wipe out the impression of defeat, and the defeated General must endeavour to perform one as soon as he feels himself strong enough for the purpose. It matters in this case comparatively little whether the particular combat is necessary to the attainment of the chief object in view ; what is wanted is a successful action at any price. On such an occasion the General will be justified in setting aside once in a way principles which are generally recognized by turning away from the enemy's main army to throw himself upon one of its smaller fractions which he thinks himself strong enough to beat.

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No means should be spared in restoring the *morale* of the retreating army. The personal influence of the Commander-in-Chief and of the whole corps of Officers will be best displayed in a retreat which will test their value and indeed that of the whole force more than any other trial. We are apt to think too highly of them when all is going well, and often attribute to their excellence advantages really due to good fortune. Tenacity, energy, spirit, and high feeling on the part of the individual soldier; discipline, bravery, efficiency on the part of the united mass, are shown in their true light after a stroke of bad luck. This is the time to distinguish between those who owe their reputation to fortune's favours and those who draw strength, counsel, and resolve from their own bosoms.

Maritime Expeditions.

If the armies which landed in the Crimea in 1854 gained the upper hand over those of the invaded country, this is due to the fact that the sea gave advantages to the assailants (notwithstanding all the difficulties which they had to encounter) not possessed by the defenders in their own country. Let us imagine the network of railways in Russia to have been as complete in 1854 as it is now, and we cannot believe that in that case 120,000 French, English, Turks, and Sardinians would have been able to maintain themselves there for any length of time. The successes of the Federal armies gained by descents on the coast of the Southern States during the War of Secession are explained by the fact that by occupying the maritime towns the Northerners deprived their adversaries of their chief resources, whilst it was impossible in so thinly populated a country to assemble quickly new armies to recover what had been lost. In Central Europe the conditions would be quite different. In the first place, the military strength of the Great Powers is so equally balanced that it would be impossible for any one of them to spare even a single corps for an uncertain enterprise on a distant shore. The French soon discovered this in 1870, and had to give way to the force of circumstances, and to relinquish their scheme of invasion by sea. "It is evident," says the German sketch of the plan of campaign, "how important it is for us to take advantage from the very first of the superiority which we possess even if we only reckon the forces of Northern Germany. This superiority will be enormously increased at the critical point, if the French undertake any expedition against the coast of the North Sea or against Southern Germany. Sufficient means remain behind to repel the former." The conclusions here arrived at will hold good more or less in any war in Central Europe. The loss of strength occasioned by detaching troops on maritime expeditions from the field army is an evil which will rarely be counterbalanced by the advantages derived from them. Until the corps which has effected a landing has gained some considerable success and has been able to make good progress, until the fleet has taken possession of a number of places on the coast, the expeditionary force will have but little freedom of movement. A bold spirit of enterprise and a very rapid advance will alone remedy this, but there will be a want of cavalry for such operations. A force landed on an enemy's coast really requires a large proportion of this arm so as to be able to explore at once in all directions, to destroy railroads at a considerable distance, and to arrest the movements of the defenders who will be gathering together from all sides. But it is of course more difficult to convey and to land horses than men or material; there is therefore sure to be a scarcity of the very arm which is most urgently required. The military organization of all the great European nations is now so well adapted to their requirements, that even if all the field troops with their immediate reserves were engaged in conflict with the enemy on or across the

frontier, a considerable superiority of force might still be brought quickly to bear against a hostile corps which has effected a landing, for there will always be large bodies of depôt troops which have not taken the field and which still remain available at their place of assembly.

Again, large inland fortresses not threatened by the enemy's field army can furnish organized bodies, in addition to which improvised corps and the general levy will all have their place in the line of defence, and will not be difficult to raise when danger is imminent. The telegraphs and the railways whose efficiency will be in no way impaired will bring up reinforcements from the most distant provinces. It is true that the assailant may also recruit his forces by landing a second corps, but much time must elapse before its arrival, and the fate of its predecessor will meanwhile be determined. Descents on an enemy's coast have therefore not only to encounter many difficulties, but have as a rule very little chance of any success worthy of note. They will therefore only be undertaken under specially favourable circumstances, the first of which is superiority of force. If Germany were attacked by two Great Powers, one from the east and the other from the west, their united land and sea forces might suffice to undertake a maritime expedition of imposing strength. There would also be a possibility of combining the operations of the expeditionary force with those of the field army of one of the allies, by which means the prospect of success will be largely increased. If Denmark had been allied with France in 1870, the latter might then have contemplated the despatch of troops to be disembarked on the easily accessible Danish coast with the view of making an attempt on the Lower Elbe in conjunction with the Danish Army, from which the cavalry, whose want would otherwise have been so seriously felt, would have been obtained. The combined army would thus have been of no despicable strength. The whole Danish Kingdom would have served as base of operations. But under such conditions as these a maritime expedition loses its special character, as only a part of the allied forces would have been brought by sea to the scene of act on.

It will always be wise, in order to gain some freedom of movement in the invaded country, to subdue a certain portion of the sea-coast. A neighbouring island may afford facilities for a safe disembarkation and for assembling the troops, but in this case the advantages of surprise will be forfeited, and the defender will gain time to make his preparations. It is evident that enterprises on a large scale directed from the sea-coast far into the interior against points of importance, even aimed at the capital, can only be undertaken when a war of long duration has completely exhausted the resources of the invaded country, when even its last resources in men, horses, and arms have been expended in meeting the assailant's field armies after their passage of the frontier. An attempt of this description may indeed be made at the very commencement of the war, before the concentration of the armies has been completed. "A French landing, if ever contemplated, was apparently to be expected in the very first stage of the war, for so distant an enterprise became manifestly impossible as soon as our armies entered upon French soil" ("General Staff History of the War," 1870, Vol. I, p. 82).

Descents of this sort are, however, more of the nature of diversions made in order to interfere with the enemy's mobilization, and to disquiet the inhabitants, than for the purpose of serious attack. A certain impression will doubtless be produced upon the nation at large if the invader, supposed to be still far away and on the other side of the frontier, suddenly appears at sea and approaching our coasts; but let us only imagine a body of 40,000 or 50,000 men being thrown by surprise on that part of our shores which is nearest to Berlin, namely, at the mouth of the Oder, and beginning its advance on the capital, we may assume that even the short period of five or

six days which it would require to reach that city would suffice for us to assemble a superior force to oppose the invader.

Coast descents are, therefore, more a bugbear than a real danger to a populous State with a good military organization.

Conclusion.

So long as the nations of this world seek after earthly goods, so long as they aim at ensuring room for expansion to their descendants together with peace and consideration, so long as under the influence of great minds they soar above the narrow limits of daily wants, aiming at the attainment of political and social ideals, so long will there be wars upon earth. What avails it to argue as to whether they have an ennobling or a barbarising influence on mankind? We can only, it is true, accept with reserve the comparison so often made between war and tempest, in that both are supposed to clear the air. The Thirty Years' War converted Germany into a desert, and produced an unparalleled state of demoralization. Again, our experience of the last twelve years in our native land inclines us to be sceptical as to the purifying effect of the last war. On the other hand, we justly consider the time when Prussia raised herself after her sad downfall and flew to arms in the cause of freedom as one of the greatest glory. The previous misfortunes had in fact acted like a storm in dispersing the sultry oppression which weighed upon the life of the nation. A fresh breeze was, as it were, wafted through the land. The moral effects of war will vary in each case with the manner in which it arises, with its result, and with the period in which it takes place.

The will of Heaven is supreme, and we may be certain that it is ordained that war shall be the lot of man and the inevitable fate of nations. Perpetual peace is not granted to mortals. We cannot now content ourselves with saying, like Machiaveli, that the *Prince* should understand war, for this knowledge is in the present day equally necessary to the *People*. They should know how to forge their weapons and should strengthen their arms so as to be able to wield them, and at the same time steel their hearts so as to fit them for standing the trials which they will have to endure in fighting for their fatherland. It is not too much to demand a right understanding of war, for "to command in war is very difficult, of this there can be no doubt, but the difficulty does not consist in the need of special knowledge or of great genius in order to perceive the true principles of warfare, for every well constituted brain which is unprejudiced, and which has some acquaintance with the subject, can accomplish this. Even the development of those principles on the map and on paper presents no difficulties, and to concert a good plan of operations is of itself no great masterstroke; the whole difficulty consists in remaining true to those principles when you put them into practice"—so says Clausewitz. The power of making use of the simple factors, of which we have attempted to give a picture in these pages, acquaintance with the moral influences which work upon men's minds, knowledge of human nature, and the capacity to see clearly what is the right thing to aim at, this is all the science which is required. Want of experience may to a certain extent be made good by a careful study of former campaigns. If after all the gap between knowing and doing is a wide one, this is simply because the tool, the army, requires a powerful hand to guide it, that further, you have to carry out your designs in face of the continual opposition of the enemy and under the influence of danger. Clausewitz likens the whole conduct of war to a "machine made up of many parts and working with enormous friction, so that what appears easy enough on paper is only accomplished by means of great exertion." The movement of masses resembles the slow tramp of the steer before the plough. It seems so easy to keep it in the required direc-

tion, and so it is for an experienced hand, but if a novice takes charge, the machine which was crawling along so heavily suddenly develops an apparently tempestuous haste. In spite of the best geometrical knowledge on the part of the ploughman, and of the clearness with which his eye can see the mark, the furrow which he wishes to be straight will be wonderfully winding. Personal disagreements, untoward accidents, misunderstandings, and errors add to the excitement of battle, the feeling of being constantly mixed up with events upon the upshot of which it depends whether great happiness or unspeakable misery be our lot; all these are influences which expose the character to the severest test in war, and of which only those who have been exposed to them can form a fair idea. They have made many an able man, who has entered upon the office of command in the field with the highest hopes founded upon the requisite amount of knowledge, lose heart and despair of success after having made the most strenuous exertions to obtain it. When one has got an insight into the art of war, when one has gained, with the help of a competent instructor, acquaintance with the principles acted upon by renowned chieftains, one naturally feels the wish to try one's own powers, and to find oneself for once in a position similar to that of Napoleon at Marengo, or of Frederick at Rossbach, Leuthen, and Leignitz; but if we turn our thoughts to the examples of unfortunate commanders who cherished the same ambition, with equal right to do so, and who after gaining the desired opportunity failed in their undertaking, being looked upon in consequence by their contemporaries as criminals and by posterity as weaklings, the remembrance of their fate will for a moment make us pause, however strong our bent may be. Is then a right understanding of war advantageous to an ordinary mortal, seeing that it may only mislead him into so dangerous a daring which may perhaps work his ruin? Most certainly it is. What true soldier would not after a short hesitation, and in spite of all considerations, catch at the chance of earning the Field Marshal's batôn, even at the risk of life and fortune? The prize is a grand one. It is the same which allures the poet and the artist on their thorny path; the prize is *immortality*. An irresistible charm dwells in that word. The successful warrior rescues his name from oblivion. Frederick and Napoleon will be heard of as long as this world lasts. "But is it worth while to expose the great mass of men to such trials in order that one of them here and there may become like unto the gods? The many thousands who have fallen in making the renown of a great chieftain remain themselves unnoticed and disappear without reward." Such may well be the judgment of shortsighted wisdom. We take a different view of the matter. Even the greatest General requires many skilful, loyal, valiant followers, who have a share in his glory. If the grave could be opened and a Macedonian could appear before us who had crossed the Granicus with Alexander, we should fancy, even if this man were but a soldier of low degree, that Alexander himself was before us. Would not a Carthaginian soldier who had crossed the Alps with the army of Hannibal appear to us as an embodiment of the great enemy of Rome? Posterity, in recalling to mind the great deeds of the past, assigns to even the humblest combatant an undoubted share in the greatness achieved by his leader. Difference of rank disappears from the recollection, and all are honoured who have taken part in the performance of great deeds, although they may have been in the lowest grade. Should we not gaze with respect and admiration at a grenadier of Leuthen were he to arise from the grave, forgetting that he had only been a soldier just like others who lived in his time, and like many who are now alive? His happy fate it was to take part in a great world-renowned event, and this ennobles him in our eyes; we do not inquire about his own personal deeds.

Thus, future generations in our land will some day envy the men who

marched with King William against Austria, against France, and laid the foundation stone of German unity. That even the unknown and unnamed soldier who would otherwise only live for the mere sake of living, would only work to eat and drink, that such a man has in war a part in the fortunes of great heroes, of divinely inspired beings, whom he aids in the performance of their great deeds, is of itself a sufficient reward. He has once in his life been engaged in the same undertaking in company with the greatest of mankind, and has become for a time their equal. Something of the feeling that this raises him above the meanness of his everyday existence will not be wanting to even the coarsest nature. Whoever owns a heart will feel it beat thereby more strongly, and will gain spirit for the soldier's calling. To defend your native land means also to gain the thanks of your country and to intertwine your own name, your own personality, with the name and the fame of your King, your General, and your nation. Empires created and made great by the sword only indeed last their time, like everything which has been or shall be on earth. "The fate of States is like that of human life; they have their rise, grow, bloom, decline, and perish." But it is better to spend your time thoroughly well while it lasts than to live too long, after the fashion of dried flowers which outlive the spring. No historian has yet placed the Chinese above the Greeks and Romans because they have survived those nations. The consciousness of working for a perishable greatness will not diminish the joy of the work. If only the name endures, and if what a nation has accomplished for the development of the human race is really great, that nation may well take other forms in course of time: it has lived long enough. To have had a part in the great deeds which it has performed is sufficient for it to be immortalized in history. We Germans of to-day are in a fortunate position. The star of the young Empire has just risen above the horizon, its course is all before it. The way to the zenith is more pleasant than the downward path from thence. If ever a rising State gave promise of durability it is Germany, strong in arms and united, amidst the Great Powers of Europe. Such a position is rightly looked upon as perilous, but the very sense of danger keeps us alive for action. If, however, our country were to rest upon its laurels, giving way to the pleasant dream that its position, its name, and its security have been established once and for ever, that after all its neighbours are not so badly disposed towards it; in such a case it would necessarily ere long become their spoil. Open on all sides, in the way of all who wish to extend their confines, its own borders occupied by shreds of nationalities which gravitate outwards, either on account of traditions, or of disquiet and love of change, unprotected by any natural barrier, it would necessarily bear the cost of any disturbance of the European system. But as far as human foresight can now discern and provide, it will not come to this; a strong arm and a sharp sword will guard the heart of Europe. We must, however, always keep before our eyes the fact that we have still to reach the summit. Excelsior! is our watchword. Uninterrupted work in perfecting our organization both for offence and defence will be our best policy for a long time to come. Our best endeavours must at the same time be given to raise the moral force of the nation, which is all-decisive in war—to raise it; not only to maintain it as it is, for "moral force can never remain at a standstill, it must decay as soon as no attempts are made to strengthen it" (Scharnhorst, April, 1806). We must then first of all convince ourselves, and those who are growing up to be our successors and whom it is our business to educate, that the time for repose has not yet arrived, and that the forecast of a final struggle to establish the permanence and greatness of Germany is no chimera engendered in the brains of ambitious fools, but that this struggle will most assuredly take place sooner or later with all the violence and earnest purpose which are the character-

istics of decisive national conflicts preceding the definite recognition of a new State. Upon this conviction must we base our determination to labour constantly by example, word, and writing to strengthen and increase in our own breasts, and in those of our children, allegiance to our Emperor, a passionate love for our fatherland, the determination to shrink from no trials, however hard, a spirit of self-denial and devotion. If we act upon these principles the German Army, which is and must continue to be the *German nation in arms;* will certainly gain the final victory.

NOTICES OF BOOKS.

The Campaign of Fredericksburg, Nov.–Dec., 1862; a Study for Officers of Volunteers. By a LINE OFFICER. Kegan Paul, London, 1886. Pp. 145. Size $7\frac{3}{4}'' \times 5\frac{1}{2}'' \times \frac{3}{4}''$. Weight under 14 ozs. Price 5*s*.

Such is the very modest and unassuming title of a book which is simply admirable of its kind. There is one puzzling question in connection with the title, and that is, why the book is a study for Officers of "Volunteers" only. The author rates the tactical knowledge of the regular Officers far beyond what we know it to be, if he imagines that one in a hundred of them will not learn a great deal from a perusal of the study he has drawn up. The arrangement of the contents of the work may be taken as a model by all who would essay to describe a battle, for it is with the Battle of Fredericksburg fought between Lee and Burnside on the 13th December, 1862, rather than with the campaign that the author deals. The campaign itself is, however, succinctly and clearly described, so that the effect of the strategy on the tactics may be thoroughly understood. The organization, *morale*, armament, and equipment of the contending forces are described, as also the personal characteristics of the Commanders. The topography of the battle-field, illustrated by well-executed maps, is then put before the student. The dispositions and intentions of the Commanders, and the course of the battle, are given in simple language. Whilst superfluous detail is omitted, sufficient detail is recorded to enable the reader to understand the causes of success and defeat. Here and there in the course of the narrative, the Line Officer gives us comments not only of great value to the student, but showing conclusively that he is in the hands of a competent and trustworthy teacher. The tone of criticism adopted by the Line Officer has somewhat an air of severity, but this cannot be considered as a blemish to the work. Messrs. Kegan Paul are the most enterprising of military publishers, but hitherto their enterprise may not, we fear, have altogether received its reward. The book before us is, however, a great success, and it is to be hoped that it may be followed by a series of similar monographs, but for subsequent writers to keep up to the standard set by "a Line Officer" will be no easy task. How the dry details of strategy and tactics may be rendered attractive and fascinating when presented to us by one whose heart is in sympathy with the gallant deeds he describes, and how deeply imbued with this feeling is the author of the work now under notice is evidenced by the touching and eloquent words which we find towards the conclusion of his study, and which make the reader long to have been with him when not long ago he stood, as he tells us, on the vine-clad slopes near Falmouth village on the battle-field, and there before him, "far and wide, between the mountains and the sea stretches the fair Virginia, for which Lee and Jackson and their soldiers,

"One equal temper of heroic hearts,"

fought so well and unavailingly; a land red and lovely, but lonely and desolate, bereft of her sons and mourning for her unforgotten dead. Yet her brows are bound with glory, the legacy of her lost children; and her spotless name, uplifted by their victories and manhood, is high among the nations. Surely she may rest content, knowing that so long as men turn to the records of history will their deeds live, giving to all time one of the noblest examples of unyielding courage and devotion the world has known."—L. A. H.

Travels with the Afghan Boundary Commission. By Lieutenant A. C. YATE, Bombay Staff Corps. Blackwood, Edinburgh and London, 1887. Pp. 472. Size 9″ × 6″ × 1½″. Weight under 2¼ lbs. Price 21*s.*

An interesting and well-written non-official account of the march of the Indian section of the Afghan Boundary Commission from Nooskhy, in Beloochistan, to Kuhsan on the Heri-Rud river, where they were joined by Sir Peter Lumsden, who arrived from England on the 19th November, 1884.

The description of this journey shows how a force amounting to about 2,000 men and transport animals were able, under perfect discipline and good management, to cross a portion of one of the worst and most trackless deserts in Beloochistan, not only without the loss of a single man, but even in comparative comfort, and after a succession of long and toilsome marches, amounting in the aggregate to 686 miles, were prepared without delay to join in the second portion of the arduous task assigned to the Afghan Boundary Commission.

The work then enters upon an excellent and amusing description of the life passed amongst the Turcomen at Bala Murghab, by that portion of the mission to which the writer was attached during the winter of 1884–85, and includes a clear and very comprehensive narrative, with plan by an eye-witness of the "Penjdeh incident" on the 30th March, which so nearly led to a rupture between this country and Russia.

In conclusion, whilst recommending it as a most readable and well-arranged book, we are of opinion that large portions relating to the political situation might be very well abridged, as these are points upon which people of all parties insist on forming their own views. We trust also we shall soon have before us a detailed account of the proceedings of the various surveying parties which were dispersed in all directions under the Officers of Engineers, the results of whose labours, at present almost unknown to the public, will, when published, probably be recognized as the most important of all the services performed by this well-organized mission.—M. G.

The Practical Horse-keeper. By G. FLEMING, Principal Veterinary-Surgeon of the Army. London: Cassell, 1886. Pp. 256. Size 8″ × 6″ × 1¼″. Weight under 1 lb. 6 ozs. Price 7*s.* 6*d.*

This work is intended as a guide to those who have to do with horses, either as owners, purchasers, or breeders, trainers, managers, or attendants, and whose experience has not been so extensive as those on whose knowledge it is based.

Mr. Fleming is so universally recognized as an authority on the matters with which the book deals, that its existence needs only to be known to secure for it a large number of readers.

Vauban, Montalembert, Carnot: Engineer Studies. By Major E. M. LLOYD, R.E. Chapman and Hall, London, 1887. Pp. 235. Size 8¼″ × 5½″ × ¾″. Weight under 1 lb. Price 5*s.*

Major Lloyd, who was not long ago Professor of Fortification at the R.M. Academy, Woolwich, is an acknowledged authority on "Permanent Fortifications," and anything from his pen on this subject is sure to be worth perusal: and the work before us is no exception. But, nevertheless, in this book there is one glaring mistake, a mistake of a character which the Editor of these Notes always endeavours to correct in the interests of the authors of the works he has to notice. In this instance the mistake, and a serious one it is, is the "Title," which may fairly be interpreted as Biographical Monographs of three distinguished engineers of ages gone by. To ordinary soldiers the lives or works of these men are matters of no importance in the practical work of to-day, and therefore the book will be passed by without notice by them. But Major Lloyd's book is something very different from this. It is a clear, well-written, and most readable account of the development of Permanent Fortification into the position in which it stands in Europe at the present moment, and an explanation of that position; and, as such, it is a work of practical value to the country. It is to be hoped that the second edition may bear another title.—L. A. H.

The Western Pacific and New Guinea. By H. H. Romilly. Second Edition. London: John Murray, 1887. Pp. 284. Size 7¼″ × 5¼″ × 1″. Weight under 1¼ lbs. Price 7*s.* 6*d.*

Mr. Romilly is Deputy Commissioner for the Western Pacific and Acting Special Commissioner for New Guinea, and is therefore exceptionally well qualified by his position to obtain accurate information respecting these outlying portions of the Empire. He is justly severe on the accounts of these uncivilized regions given to the world by the class of travellers known as "T. Gs." Mr. Romilly has lived so much behind the scenes that this book is valuable and most interesting. Whilst perusing it, however, the reader seems to feel that Mr. Romilly knows a great deal more than he cares to tell. Let us hope that the corner of the curtain having been lifted up, we may some day have it completely raised by the same hand.

Sketches of some Distinguished Anglo-Indians, with an account of Anglo-Indian Literature. By Colonel W. F. B. Laurie. New Edition. London: Allen, 1887. Pp. 407. Size 7½″ × 5½″ × 1½″. Weight under 1 lb. 10 ozs. Price 7*s.* 6*d.*

The contents of this book so far as they go seem to have been accurately compiled. It is, however, impossible to find out on what principle the author has selected his distinguished Anglo-Indians. Sir James Outram is favoured with a passing glance only; of John Jacob, Nicholson, of the men who have executed gigantic industrial works which have saved the lives of millions we are told nothing. Too much must not therefore be expected from the work as a book of reference —L. A. H.

England at War: the Story of the Great Campaigns of the British Army. By W. H. Davenport Adams. 2 vols. London: Remington, 1886. Pp. 652. Size 8¾″ × 5¾″ × 2¼″. Weight 3 lbs. 9 ozs. Price 21*s.*

Commencing with the military system of England in the reign of Henry VIII, the author, carefully citing his authorities, gives us a concise account of the campaigns up to the present day. The book will be very useful for reference to those who must confine their literary baggage to "multum in parvo."

Traité Théorique et Pratique de la Régulation et de la Compensation des Compas avec ou sans Relèvements. By A. Collet, Lieutenant de Vaisseau, Répétiteur de l'École Polytechnique. Paris: Challamel Ainé, Editeur. Second Edition, revised and augmented, 1886. Pp. 310. Size 10″ × 6·5″ × 1″. Weight 1 lb. 10 ozs. Price 8*s.*

Four years have elapsed since the first edition of this excellent work was published, a notice of which appeared in the Journal of this Institution soon after its publication in 1882. During this interval the author has revised and augmented his book, bringing into it the results of his own observations at the French naval ports, and those of his brother Officers with whom he has been in communication. In order to aid his readers in at once taking up the new parts all additions are specially enumerated in the analytical table of contents at p. 309.

In the preface will be found some important references to recent regulations on the subject of compass observations in the French Navy, and not least among these, is that ordering the analysis to be made of every ship's deviation, when she is completely swung, so that on any intermediate occasion a complete table may be computed from observations of the deviations made on the cardinal points adjacent to the course on which the ship may be steering.

In his chapter of advice to the reader, M. Collet makes many useful remarks as to the manner in which his book should be read, adding a summary of its contents. In his concluding remarks he writes: "The determination of λ, or the mean value of the force on board ship causing the needle to point to the north, is indispensable for all compasses whatever they may be." It may be remarked in passing that the practice here so strongly inculcated has been for many years largely carried out in

the Royal Navy of this country. It is often supposed that if a compass shows little or no deviation that it is doing its work satisfactorily. When, however, it is considered that such a compass may possibly have only two-thirds of the earth's directive force acting upon it, with which to overcome the unavoidable friction of cap and pivot even when new, how much more is it important to have a high value for this coefficient when wear and tear on service have been at work.

In the former notice of this book already referred to, it was remarked that "from a theoretical and—in a less degree—from a practical point of view," the book would prove of great interest to those desirous of the latest information on the subject of which it treats. The practical man will be glad to find that certain parts of it have been so far rewritten agreeably to his requirements, that the words "in a less degree" may be considered as no longer applicable.

In Chapter VIII, Part III, p. 193*b*, there is a clear exposition of the investigation made by Captain Koldeway, of the German Naval Observatory at Hamburg, for ascertaining the effects of a vessel's steaming on or near a given course for several days in producing deviations of a temporary character. Although some fair approximations have been obtained from a large number of cases, the subject is so surrounded by difficulties involving time, speed, quality of iron, the magnetic condition of the ship when starting on the voyage, &c., that only observations conducted under conditions generally unattainable would ensure exact results. In many vessels of war one hour's firing would probably render a whole month's subsequent observations valueless for this purpose. Much valuable information, however, of a practical nature might be obtained by watching opportunities and recording the details of the surrounding circumstances.

At the close of the book a hexagonal abacus is given providing a graphic means of forming a deviation table from two bearings. Judging from the small use which has been made in England of other graphic methods ingeniously contrived and easy of application, there does not seem much to hope for as regards the adoption of the abacus.

There is one source of regret in closing this book, that those who read only this second edition will lose the advantage of a perusal of the faithfully told "Exposé Historique," which formed such an excellent introduction to the first. It is to be hoped that in the future the "Exposé" will be rescued from a temporary place of oblivion.—E. W. C.

Roll of Officers of the York and Lancaster Regiment, from the Formation of each Battalion to the present Time. By Major A. G. Raikes, F.S.A., 3rd Battalion York and Lancaster Regiment. London: Bentley, 1885. 2 vols. Pp. 324. Size of vols. together $8\frac{3}{4}'' \times 5\frac{3}{4}'' \times 1\frac{1}{2}''$. Weight under $2\frac{1}{4}$ lbs. Price 21*s.*

These volumes, which are the result of a great deal of labour, contain the names and services of upwards of 1,700 Officers, arranged in successive lists according to rank, and also alphabetically, giving every detail, including war services. It appears that between 1,300 and 1,400 volumes have been used as references for the compilation, so the magnitude of Major Raikes's task can be imagined.